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ENGINEERING AND
MINING JOURNAL

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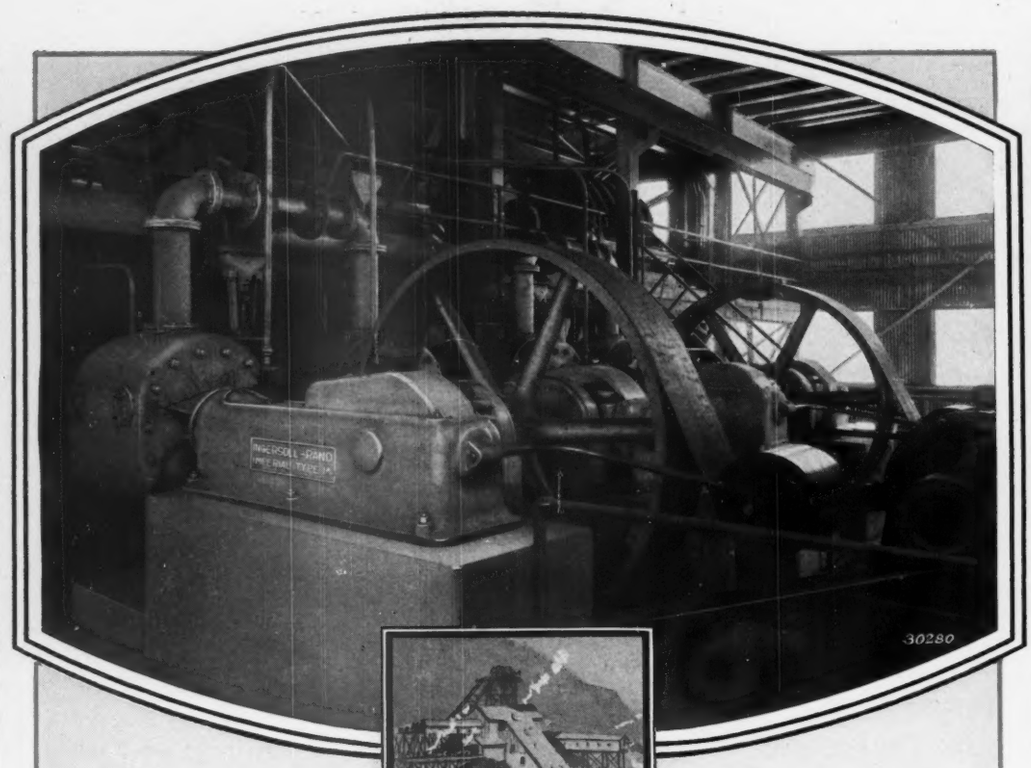

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New York, April 13, 1929

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NO LONG ARTICLE ever ends just where it should; it usually falls short of filling a page or runs over to the next. This can be remedied to some extent by "cuts and fills," but usually a "short" is required. Though sometimes called a "filler," it must be more than that. The short pieces are, because of their brevity, more easily read, but if they are not interesting the reader is cheated. Every effort is made to confine those published in *E.&M.J.* to material that is worth reading. It is evident, therefore, that no engineer should hesitate to submit an interesting paragraph or two to the editors because he feels the manuscript to be too short to be worth while.

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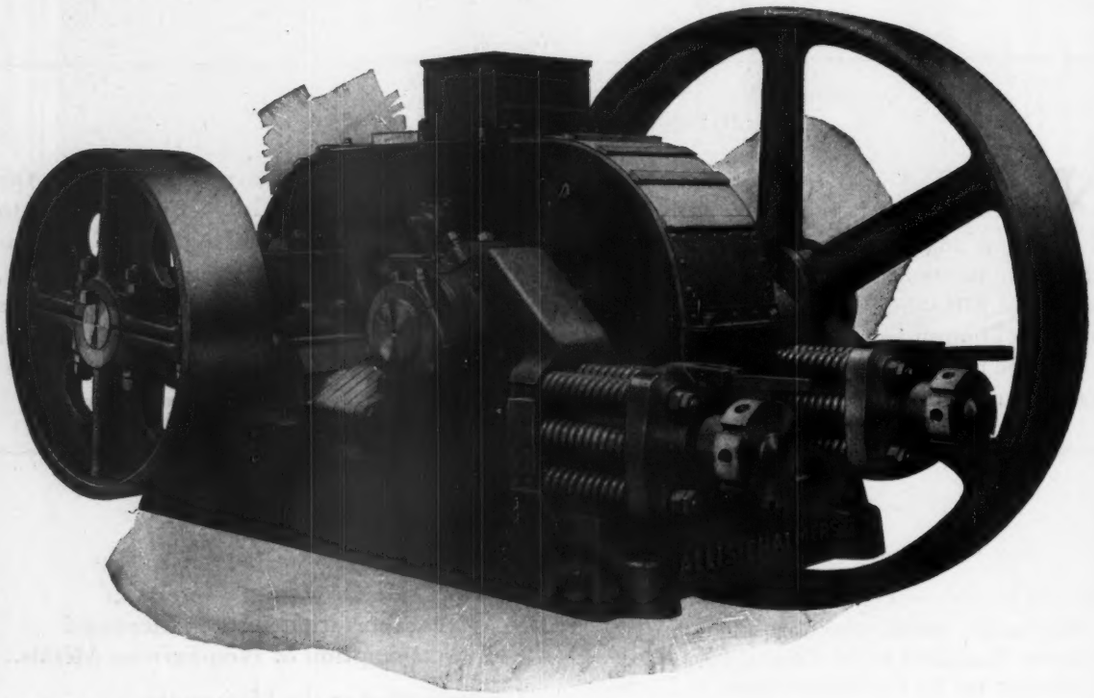

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Mergers, Absorptions, and the New Competition

"*TIME*," a weekly news magazine, a condensed record, has the opportunity to classify current events; and it does so effectively. Major trends are emphasized by brevity in presentation, so that even he who runs may read. A recent issue carried on one page the laconic title "Mergers." The week's harvest was recorded. Among banking coalescences came first that of the old-established Bank of United States (Manhattan), which now boasts of resources totaling 260 million dollars, with 36 units; and other groupings of lesser degree in the same field of activity. Followed the announcement that three nation-wide haberdashers had become one. "Plenipotentiaries" of the American Radiator Company had met in conference with the executives of a leading plumbing concern, looking to the formation of a merger organization to be capitalized at 172 million dollars. And so on.

The consummation of such unions is as inevitable as death and taxes. To look ahead is to envisage amalgamations wherever economies in production can be effected and better service provided for the customer or the client. What, then, will become of the competition that its protagonists allege is the life of trade? Is the new industrial age to be one of complacent performance, secure in the knowledge that rivals have been seduced and competitors bought out?

By no means. Competition will continue, for awhile at least, keener than ever. But it will be a new type of competition, with the goods or the services as factors of secondary importance. Whereas the fight was formerly for the customer's dollar, it is now for his good will—so that the second dollar will follow the first, by reason of a faith established by evidence of an intangible quality sometimes defined as a reputation for decency and fair play.

A few years ago a cultured but venturesome individual, bent on discovery, disappeared from his customary circle of associates and took his place among the manual workers of mines and factories, in Europe and in the United States. A grueling apprenticeship followed, from which he never flinched. From this university of hard knocks and strong language he graduated with a profound and complete knowledge of "What's on the Worker's Mind"—the title he—Mr. Whiting Williams—gave to a remarkable volume of experiences and deductions, published subsequently. We heard him describe his excursions soon after he returned to "society." And again, more recently, we were privileged to learn from him of maturing philosophies on the problems of industrial life—including the viewpoint that the "domestic" relations within an organization must be human and harmonious before the company can hope to cultivate a satisfactory standing in the eyes of the general public. Good, sound common sense, this. And in the struggle for what might be termed social acceptance comes the competition that is inevitable between industrial giants.

Eventually the customer's dollar will go to the concern that is held in the highest esteem by the buying public. Such faith is built upon good works; and behind good works must shine a personality or several personalities of good influence on national life. Even mining companies must realize this. The casual redistribution of amassed wealth, even in spectacular causes, merely evokes sympathy for the donor's lack of understanding of human nature. Charity should begin at home. The consolidation of business interests and the pooling of resources will be tolerated only in proportion to the opportunity and obligation accepted for the growth of great men, of powerful but benign influence on current social and industrial history. Name an industrial leader of this type, and you will point toward an organization with an enviable reputation.

As between the soulless aggregation of business units—the profit-snatching corporation—and the coalescence of mutual business interests that grows into a national institution, the public will be quick to choose. Even the producers of raw materials must meet this acid test, as a result of which even the strong in resources, though weak in purpose, will go to the wall by reason of a failure to foresee a future in which social relations and decent business manners will exact a powerful but subtly attractive influence on the customer's dollar.

Local Prosperity Stimulated by Increased Copper Price

ALTHOUGH the current copper price and abundant production have brought prosperity to the copper-mining companies and their shareholders, their effect upon local prosperity has been an important factor for some time in the copper-producing states of Montana, Utah, Nevada, and Arizona as well as elsewhere. Payrolls have been substantially increased, and the number of workers is greater than for years. This vitalizes local business because money is freer. Supplies are purchased in larger volume and the use of equipment at full capacity insures increased business in new equipment for both renewals and expansion.

Another element that is not quite so conspicuous is the increase in taxation revenues to the states. As an example, an increase in assessment valuation of the Utah Copper Company of close to $29,500,000 is indicated in 1929, compared with the assessment valuation of 1928. Gross yield in 1928 was $44,500,559, compared with the

1927 gross yield of $32,961,917 and total deductions of $18,646,324. Total valuation for tax purposes in 1929 is $84,394,441, of which $12,294,383 is on real estate, machinery, supplies, and improvements, the balance of $72,100,058 being the mine valuation computed upon the basis of three times the net proceeds for 1928. Thus the State of Utah participates in the prosperity of the mining company. A similar condition prevails in the other copper-mining states.

The regional importance of mining as a factor in the general business welfare needs to be kept before the public. The miner puts the edge upon the business of his community and the mining company is an important taxpayer to the state.

Simplified Practice and Its Resultant Savings

SIMPLIFICATION OF PRACTICE—the doctrine that has been preached to American industry by the Department of Commerce ever since Mr. Hoover, when Secretary to that department, established the division of simplified practice in the Bureau of Standards as part of his waste-elimination program—is undoubtedly playing a part in the general prosperity of today, though one that naturally is hard to appraise. Its adoption spells advantages to producer, middleman, and consumer in ways which may readily be surmised by even a brief consideration of the probable effects of reducing a wide range of styles, models, and sizes of a product to the comparative few in which the bulk of the business in that commodity is done.

To the producer, simplified practice means the reduction of capital tied up in slow-moving stocks and the more economical manipulation of the models and sizes on which he concentrates. The middleman likewise gains by the elimination of slow-moving stocks and the resulting increased turnover, as well as by his new ability to concentrate on a narrower line. The consumer profits, although indirectly, through the better values, quality, and service which the manufacturer and dealer are able to give him. Evidently, if industry has adopted the simplification program to any considerable extent, the resultant saving should be large. Thus far, recommendations as to simplification covering ninety different commodities have been adopted by representatives of manufacturers, distributors, and users at conferences held under the auspices of the Department of Commerce. In most cases the percentage of elimination of models and sizes has exceeded 50 per cent. The present significance of the movement lies in the fact that the practice of simplification is growing.

The federal government is taking the medicine that it recommends to industry. In purchasing its own supplies it is following a greatly simplified practice. Three hundred and ninety-six contract forms have been simplified and reduced to two. Two hundred and forty-four laws governing contracts have been repealed and supplanted by one. Sixty-one department and division purchasing agencies have been reduced to one. And innumerable forms of leases have likewise been reduced to one. "Business" has surely increased in government, so the latter is amply justified in preaching simplification to business.

Utility Rather Than Rarity May Make a Metal Precious

FROM GERMANY comes the report that a scientist at Greifswald University has discovered a new use for silver—for the commercial sterilization of water to be used for drinking purposes. The statement is made that 1½ grains of silver prepared in a special manner will destroy the germs in ten million quarts of water. The success of the proposed treatment would seem to depend in part at least on the degree of contamination; but, considering water with normal germ content, no one need be unduly skeptical as to the claims made. We suspect that the silver used is in colloidal form. If so, the physico-metallurgist will have contributed to the discovery.

Most of the rarer metals when in colloidal form are highly toxic and antiseptic. A method of producing colloidal tellurium, for instance, by means of barium sulphide, resulted in a product of promising value as a germicide, fungicide, preservative—even at high dilution. Silver may be prepared in colloidal form by the action of one of several reducing agents. A wide variety of colors may be produced thus—white, yellow, blue, gold, red, green, black—according to the particle size of the silver in the "sol." Argyrol, the styptic qualities of which are realized by those who have experiencd an application in the eye, is made by the interaction of nitrate of silver and proteose—a product of the digestion of a protein.

Research in the preparation and utilization of metals in the colloidal form is a promising and a fascinating field. The world has hardly grasped the significance of recent developments in chemical methods of forming the ultramicroscopic. Recently we learnt of the successful use of colloidal nickel in the treatment of boiler water. Nickel carbonate is formed, and the calcium and magnesium salts are preserved in a condition in which they are incapable of crystallization. A wider use of colloidal silver as a germicide may well contribute to a reduction in the spread of disease in drinking water, and so aid the progress of civilization.

Use of Electric Furnace Increases in Mining Industry

THOUGH world steel production increased about fourfold in the twenty years since 1908, output of electric steel expanded about 218 times, so that now nearly three per cent of all the steel produced is made in the electric furnace. The success achieved with this type of furnace in the manufacture of tool and alloy steels led to its adoption in the steel-casting industry, where its use resulted in sounder castings than could be obtained by other means. As numerous renewable castings are required in practically every branch of the mining industry, the present interest taken by the larger mining companies in such equipment was to be expected.

Costs of electric-furnace operation are said to be exceedingly low, and under certain conditions a mine installation has saved its initial cost within a year. The charge for such furnaces usually consists of iron and steel scrap commonly found on a mining property. Steel produced

is used for renewable parts of mine and mill equipment that vary in size from large crusher roll shells to small grinding balls. Obviously, a considerable saving should be effected by such practice, not only because an ample supply of renewal castings is maintained, but also because the actual cost of the castings, in most instances, is less than if they are purchased.

Castings required in mine and mill operations are usually of standardized character, and the foundry problem is therefore a comparatively simple one. Moreover, direct and indirect costs of an adequately stocked storeroom are high, and the result of a breakdown of a part that cannot be replaced from stock often involves a serious expense. For these reasons, particularly, employment of an electric furnace should be an important factor in obtaining lower costs at those properties where electric power is available and the magnitude of operations warrants an installation.

The Mining Industry and Burdensome Taxation

THE basic nature of the mining industry in the Western states, and the effect of its wage disbursements in maintaining local prosperity, as well as in contributing materially to regional prosperity, would appear to be sufficient reason for a careful consideration of the tax burdens carried by the industry and should deter legislators from imposing additional burdens of this kind. However, an impression seems to exist in the minds of state legislatures and others that ore from a mine is a gift of Nature and that the mine owner should not complain about additional taxation. Generally these groups overlook the fact that the incidence of fresh taxes can always be avoided by greater economy in public expenditures and by a refusal to finance every whim of the electorate. So-called demands of the public, when traced to their sources, are frequently found to represent efforts of small minorities actuated by self-interest.

Another point generally overlooked is that the rate of public spending in many instances has been accelerated beyond what good public policy and proper administration of the business of the political units would justify. Attempts are made to provide for public needs far into the future, many of which might well be left to the generations to come. Every minority desires immediate satisfaction. Rome was not built in a day, and the Western states likewise have a long life ahead of them. As a consequence, the rate of expenditure should be adjusted to accord with reasonable ability to pay. Discounting the future by huge bond issues merely increases the stress of living and, worse still, definitely discourages industry.

At least three Western states, Montana, Utah, and California, have attempted to increase the tax burden upon mines. The legislatures of Montana and Utah wisely abandoned their efforts in this direction, but California, with a more heterogeneous population and less appreciation of the mining industry, has passed legislation that will increase the tax burden upon both metallic and non-metallic enterprises. The gold mines have long labored under the handicap of adverse economic conditions, but from their meager profits California expects to take another slice. The non-metallic enterprises are in a more favorable position, but intense competition lessens this advantage considerably, and the incidence of this new tax will be felt strongly by them as well.

To remedy this situation the mining industry must take a greater interest in all expenditures of political units. It should join forces with other industries, and all should scan public disbursements critically and do their best by intelligent censorship to bring about the decrease in state, county, and local taxation which is so badly needed in some sections of the country.

Metal Prices and Their Effect on Exploration Work

WITH copper selling at its present high level, it is natural to expect a renewed interest in the search for new copper mines, and greatly increased activity in the development of known deposits that have not heretofore been particularly attractive. So far, however, the increase in copper output has come almost entirely from established producers. The only new mine of any importance that comes to mind as having been added to the ranks of United States producers in the last year is the Verde Central, in the Jerome district of Arizona, which was developed by Calumet & Arizona. Of the mines that were closed, several have reopened, but only three or four are producing, among them North Butte, Quincy, and Seneca. North Butte and Quincy would probably have reopened even though the price of copper had not registered such an advance.

On the other hand, the lead market has not been a particularly brilliant performer in the last few years, and yet several new lead mines have been developed recently. Some are already paying dividends, such as North Lily, Dayrock, Golconda, and New Quincy. Active development of lead-zinc prospects in Butte, the Coeur d'Alenes, Park City, Tintic, and Pend Oreille is a notable feature of current mining news.

Why this apparent anomaly? Several reasons may be adduced. For one thing, big reserves of low-cost copper are being developed in Africa, Canada, and elsewhere, which seem likely to be adequate for any probable increase in consumption, so that little hope is entertained that a shortage of supply will keep prices at fancy figures. Secondly, copper was in the doldrums for so long that those interested in its production in a small way became discouraged, and cannot yet believe that better times have come and are likely to persist. If the market continues strong for any length of time, copper prospects will be in more active demand. A third consideration has made for the active development of lead claims even without high prices, and that is the development of selective flotation, which enables any one to make two profitable products from a complex lead-zinc ore that was formerly more penalized than paid for, oftentimes. Finally, two or three years are necessary in most instances to bring even a small mine into production, and reopening of an old mine is not so simple as one who has never undertaken the job might think. As soon as a definitely higher level of copper prices seems reasonably assured over a period of years, more interest will be taken in potential producing properties, and in time the custom smelters may need additional equipment to take care of the small shippers.

Theorizing May Be Made Helpful to Practice

SCIENCE is essential to industrial and human progress, and a theoretical investigation that appears to lead nowhere may point the way eventually to a development of vast economic importance. To minimize the value of independent research would be unwise, although financial considerations may explain why some research is the most sensible and logical to undertake. If no need for a change apparently exists, or if no remedy is sought, pure research, within reasonable limits as to expenditure, is always worth while, if capable men are in charge. To make a problem in order to justify a research program for its solution is as intellectually dishonest a procedure as is known to science. And yet examples are not far to seek. In fact, bubble reputations have easily been made thus, by stressing the complexity of the work and camouflaging the reasons for the investigation.

In another quite different class is the worker who delights in an excursion into the unknown, especially when he expects that his wanderings may lead to a solution of a problem confronting him or the industry he represents. A recent treatise on industrial carbon, written by Dr. C. L. Mantell, provides interesting examples of the value of pure research to industry in general. The volume will serve as an excellent foundation for further development and will prove stimulative of a deeper interest in a vital subject. Other than in connection with flotation, however, the metallurgist has been too absorbed in his metallurgical and chemical problems to give much heed to what has been done and what possibly can be done in the borderland field of physicochemical reaction. As Doctor Mantell maintains, in concluding the chapter on metal-adsorbent chars: "Other than in its specific application to gold and silver metallurgy, the adsorbing power of chars for metals has been little studied. The adaptability of its application for removing metal contaminations opens up interesting possibilities in many diverse applications in industry."

A study of the pages prompts a little excursive thinking on the subject of research and its effect on theory and practice. Several years ago a series of misinterpreted experiments led to the conclusion that the so-called precipitation of gold in aurocyanide solution by charcoal was due to occluded carbon monoxide gas. The verdict found wide acceptance, supporters of the theory differing only as to the precise character of the chemical compound formed. In opposition to this contention a mass of evidence was adduced by an independent investigator to show that the "precipitation" had all the characteristics of an adsorption—a view that forecast more extensive research in an effort to benefit from the wealth of knowledge available in the field of industrial colloid chemistry. Every argument—and many arguments were advanced—clinched the fact that carbon monoxide had nothing to do with the result obtained; and that the reaction could not be expressed in terms of a chemical equation, any more than could the abstraction of dye by cotton, or picric acid by platinum black. Confirmatory research by others served to substantiate the new point of view.

So much for the initial research and its results. Came approval from many quarters. In time, also, came an endeavor to upset the new theory by the assumption that chemical action and adsorption were incompatible, and that another theory might be evolved, from research, but with no economic end in view. The investigation was made—with pure solutions. It indicated that, under such conditions, simple adsorption was not the action, but that the calcium and carbon dioxide associated with the char might effect a preliminary change, whereby the ultimate effect and not the immediate effect was an adsorption.

This conclusion helped in no way to advance the art, nor was it acceptable to operators, who have had experience with working cyanide solutions and commercial solvents, and who realize the complex calcium content of such solutions, the varied form in which the cyanide may exist in the solution, and the impossibility of determining whether a common solvent such as black cyanide is composed of sodium chloride and calcium cyanide, of sodium cyanide and calcium cyanide, or of a mixture of all three. The acceptance of the original theory, that the "precipitation" was an example of adsorption, suggested fine grinding and possibly the activation of the precipitant. The subsequent research, carried out in an endeavor to modify this theory, promises no economic result, and its soundness could not be proved so far as working solutions were concerned. Such an example suggests that whereas pure research may be extremely valuable, a research with an object in view is usually preferable from the economic as well as from the technical standpoint.

Licensing of Engineers Again Up on the Coast

PERSISTENCY worthy of a better cause has resurrected the engineers' licensing bill and brought it before the present California Legislature, when everyone was under the impression that it had been forgotten after having been chased from the legislature two years ago. The engineer's license, if the law passes, might well have in red letters across its face something similar to the stock-selling permit issued by the California State Corporation Department, which states that the permit is permissive only and not a recommendation or an endorsement of the issue. The license might therefore read: A permit to practice but not an endorsement of the individual.

Licensing of technically trained engineers is relatively unimportant. It will not be conducive to better engineering, nor will it meet any urgent necessity, for the fact remains that engineers in California and elsewhere have functioned and worked for many years without badges on their lapels or engrossed papers in their inside pockets, and apparently every one has been reasonably happy. Many engineers are indifferent to the licensing urge, some oppose it, and a small minority support it. For certain classes of engineering work, licensing is no doubt desirable. Where human lives are at stake a good argument can be made for some regulation of the intelligence and experience of the men responsible for engineering work. But in spite of praiseworthy efforts to the contrary, the delimitation of engineering becomes more difficult as the years slip by. The legislative mill could grind on indefinitely and not catch up with the shifting conditions of the engineer's vocation. A blanket licensing of all engineers, of which *Engineering News-Record* has tabulated some 240 varieties, seems far from an ideal solution of the problem, such as it is.

The Known Tin Deposits of Alaska

Little Ground for Hope That the Territory Will Ever Be an Important Producer

By Ernest N. Patty

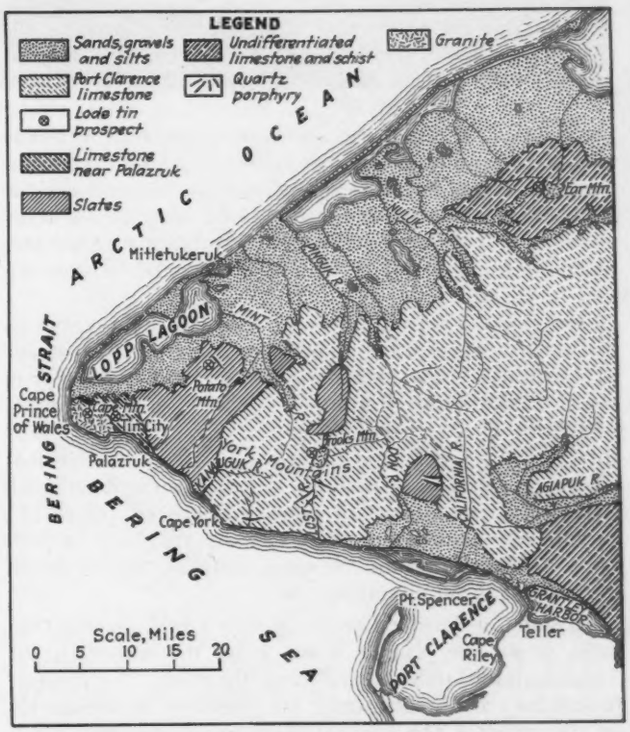
Dean of the Alaska Agricultural College and School of Mines, College, Alaska

SINCE the discovery of tin in the York district of Alaska in 1900, the territory has produced ore containing 1,081 tons of metallic tin, valued at $1,042,000. This accounts for the bulk of the tin actually mined in the United States during the last 28 years and is a sorry showing for a country that consumes more than 60 per cent of the world's production of this metal. There is no reason to expect that Alaska will ever rank as an important tin producer, but apparently the most important reserves in the United States are localized in the territory, and we should have a better knowledge of their possibilities and of their limitations. Recent communications on tin which have appeared in *Engineering and Mining Journal* indicate that this knowledge is not generally available to those interested in our tin resources, and this fact warrants my presenting the following notes:

The York district, on Seward Peninsula, and the Hot Springs district, adjacent to the Tanana River, have accounted for 98 per cent of the tin ore shipped out of Alaska. This has been chiefly in the form of stream tin and has been produced in conjunction with placer gold. The placer deposits of the York district are fairly well worked over, but there is renewed activity in lode-tin developments in that section, and several of the prospects offer promise. Placer tin of the Hot Springs district has been recovered as a byproduct of placer gold mining, and since this area has only been worked over by individual miners seeking the richer spots, a considerable reserve of placer tin still remains in the unworked gravels of the area.

During 1928 a company formed in England, and incorporated as the Alaska Gold Dredging Company, purchased a large block of the best ground in the Hot Springs district, and it is now engaged in work preliminary to installing dredges.

The stream tin of the Hot Springs district is confined to the Sullivan Creek section of the area. An area of possible dredging ground is 3 miles long by 1,000 ft. wide, these being approximate limits defined by random prospect holes put down over the district by miners in search of high-grade concentrations. Drilling to determine the exact yardage of workable gravel is now in progress. From an examination of the various dumps about the prospect holes I carried away an impression that the placer tin has its important concentration in a strip probably 2 miles long by 300 ft. wide. This strip has yielded about 600 tons of tin concentrate, or better than one-third of the Alaskan production. As nearly as can



Geologic sketch map of the west end of Seward Peninsula, showing relation of tin deposits to intrusive rocks. By Adolph Knopf. 1907. Courtesy U. S. Geological Survey.

be estimated about one-half pound of tin concentrate per square foot of bedrock remains in the gravel, or in round numbers about 1,500 tons of concentrate, but when the area has been systematically drilled there is a possibility that this reserve will be doubled. Essentially, however, this will be a gold-dredging project, with the tin as a byproduct. The gold- and tin-bearing gravel in this section averages 4 to 6 ft. in thickness and is covered with 40 ft. of frozen muck. This dredging project should produce 100 to 150 tons of tin concentrate annually for the next ten years.

The bedrock of the area is chiefly slate with granitic intrusions near by. In this district the adjacent granite has been prospected without success to locate the lodes from which the placer deposits have been derived. The district is heavily covered with hillside wash, but it is possible that the present placer development will disclose

Lode workings and camp on Cassiterite Creek, Seward Peninsula. Looking upstream, the rough surface to the right of the point where the creek disappears near the center of the view is the "reef rock." Courtesy U. S. Geological Survey.

the bedrock source of the tin. The concentrate varies in size from a millimeter up to pebbles 3 or 4 in. in diameter and is well polished and rounded. These cassiterite pebbles show numerous inclusions of brecciated quartz, showing that the tin-bearing solutions were injected into older quartz veins which had been reopened by shearing and brecciation.

The Yukon-Tanana province from the Hot Springs district westward to the Ruby Mining District, a distance of 150 miles, shows occasional stocks of granite, and in some of the streams draining these stocks, placer prospectors have found sparing amounts of stream tin mixed through their black-sand concentrate. It is possible that placer prospectors, with their attention riveted on gold, have passed by important concentrations of placer tin, so both lode and placer prospectors, particularly in such areas as the Cosna and Nowitna districts, should be on the watch for tin mineralization.

Deposit on Moran Creek—Moran Creek is about 35 miles down the Yukon River from the settlement of Tanana and 20 miles inland from the river. At present, prospectors are investigating the discovery of stream tin on this creek. The concentration here does not appear to be as heavy as in the Hot Springs district, and it will take considerable prospecting to determine if there is a commercial deposit.

Ruby District—Leaving the Alaska Railroad at the town of Nenana, and traveling down the Tanana River to its confluence with the Yukon and then westward with that river toward Bering Sea, one gets an adequate impression of the vastness of the semi-deserted Yukon-Tanana region of interior Alaska. The monotony of the dense undergrowth along the river is broken occasionally by native fish camps with the salmon drying in the sun; the setting seems more typical of a tropical river than one in sub-arctic latitudes.

The town of Ruby, perched on a bank of the Yukon, was, until ten years ago, a prosperous placer mining camp, but the richer ground has been worked over and the camp has deteriorated rapidly to a ramshackle state that would be depressing if it were not for the typical Alaskan hospitality of the people who have remained.

Small quantities of stream tin have been produced from Big, Birch, Midnight, Greenstone, Long, Ruby, Spruce, Monument, and Trail creeks in the Ruby camp. This has been incidental to placer gold mining, and in no instance has the amount of tin produced been large enough to warrant any hope of an important tin production coming out of this district.

On Big Creek I had an opportunity to weigh up some tin concentrate and to measure the yardage of gravel which had produced it; this showed an average of one-eighth of a pound of concentrate per cubic yard of gravel. On Big Creek there is little tin in the gravel except near the head of the creek. Much of this concentrate shows distinct crystal form, with sharp edges, so it is evident that its bedrock source is within a few thousand feet of where it was found. The low, rounded ridges which separate the various streams are deeply mantled with overburden, but by careful test-pitting and panning in localities such as the head of Big Creek, there is a possibility that the bedrock occurrence of the tin could be located. As elsewhere in the Yukon-Tanana region, the occurrence of the cassiterite is closely related to granite stocks.

Small quantities of stream tin have been collected from time to time by placer miners in the Poorman and Innoko districts and on Deadwood Creek in the Circle district. There are also many minor occurrences of stream tin from other districts in the Yukon-Tanana province, but in the light of our present knowledge the Sullivan Creek section of the Hot Springs district is the only area that shows any promise of developing into an important producer.

York District Being Developed

The York district, on the western tip of Seward Peninsula, produced 50 tons of placer tin, valued at $35,000, during the summer of 1928, and this district is also showing renewed activity in the development of cassiterite-bearing lodes. The occurrence of tin-bearing lodes in this area is widespread, but although considerable money has been spent in sporadic development work, none of the operations has been profitable. The area has been studied carefully by members of the U. S. Geological Survey,[1] and judging from their reports it merits additional development. For example, Steidtmann

[1]Knopf, Adolph: "Geology of the Seward Peninsula Tin Deposits, Alaska." U. S. Geological Survey *Bull.* 358, 1908.
Steidtmann, Edward, and Cathcart, S. H.: "Geology of the York Tin Deposits, Alaska." U. S. Geological Survey *Bull.* 733, 1922.

and Cathcart[2] in their description of the Cassiterite Lode, estimate 107,488 tons of tin ore available above the adit level of this deposit. They further state that mill tests on lode material, obtained by trenching a 2,000-ton dump thrown out from adit No. 3 of this property, are said to have averaged 4 per cent of concentrate. The assay of the mill concentrate averaged 62.33 per cent tin and 11.08 per cent tungsten. If this information is accurate, and the samples represent an accurate average of the tin-bearing lode, there is no apparent reason why such a property should remain dormant.

The physical conditions of the York district are not favorable to decisive development by companies working with scant capital. First of all, the district is located on the extreme western tip of the continent, about 40 miles south of the Arctic Circle. Cape Prince of Wales is a granite stock showing some tin mineralization. Off this bleak cape we have Bering Strait, which connects Bering Sea and the Arctic Ocean. The ice-pack comes down from the north and closes these waterways for seven months each year. During the winter months the district can be reached from Nome by dog sled or airplane. In the summer small "gas" boats operate northward from Nome and an occasional schooner assists in solving the transportation problem.

The camps of Tin City and York were the distributing centers, but now Tin City is deserted and there are not more than a handful of white men in York. Port Clarence, 20 miles distant, is the only available harbor, but during good weather men and supplies can be lightered ashore at York.

The country presents a typical arctic landscape—tundra-covered lowlands near the coast, and farther inland the York Mountains stand out starkly like a desert range. A few scrub willows are found in the valley bottoms, but except for driftwood there is no timber supply in the district.

Tin Found in Gold Placers in 1900

During the summer of 1900 Alfred Brooks, of the U. S. Geological Survey, recognized stream tin in the concentrates secured by placer gold miners. Since that time the placers have produced more than $600,000 in tin, plus considerable gold. Buck Creek has been the important producer, although placer tin is widely distributed in the streams of the Seward Peninsula. Some of the ground worked on Buck Creek has yielded as much as 8 lb. of tin concentrate per cubic yard of gravel and some of the smaller creeks have averaged as high as 21 lb. of concentrate per cubic yard. During 1911 the York Dredging Company installed a tin dredge on Buck Creek, and in 1915 the American Tin Mining Company built a dredge on the same creek, but both of these dredges have been idle for several years. Placer production has accounted for the bulk of the tin shipped out of the York camp. The better placer tin deposits have been mined, and future production must come largely from the lode deposits.

Collier, of the U. S. Geological Survey, while engaged in field work in the York area during the summer of 1903, made the first actual discovery of lode tin ore in place, and this discovery was later staked by three prospectors and named the Cassiterite Lode, a deposit which turned out to be one of the most promising prospects of the district. During recent years lode developments have been practically at a standstill, but during the summer of 1928 a company organized as the National Tin Mining Company took over the property of the Lost River Tin Mining Company and initiated a new development program. The company is exploring a tin-bearing dike about 12 ft. wide which is reported to average 2 per cent tin.

Geology of the York District

A study of the well-prepared reports of the U. S. Geological Survey[3] indicates that the York district is underlain by an extensive granite batholith, which, at the time of its intrusion, was mineralized with tin and also with some tungsten, gold, lead, zinc, and copper. Four granite stocks projecting high above the general level of the batholith have now been well exposed by erosion and stand as topographic domes. These are Cape Mountain, Potato Mountain, Brooks Mountain, and Ear Mountain. These four cupolas are the loci of the tin mineralization so far discovered. Several of the larger have smaller satellites which are not so well exposed, and the pendants of metamorphic rocks separating these satellites from the larger cupolas contain some of the tin

[2]Idem, p. 73.

[3]U. S. Geological Survey *Bulletins* 229, 284, 358, and 733.

Workings on Cassiterite dike on east side of Cassiterite Creek (at left) and on the greenstone lode (at right). Courtesy U. S. Geolgical Survey.

mineralization. For the most part the batholith is roofed by older Paleozoic slates, limestones, and schist. Greenstones occur in the slates. Granite and quartz porphyry dikes cut all of the formations, and in places these dikes carry commercial amounts of tin minerals. Cassiterite is the chief ore mineral; stannite has been found at one locality and Knopf[4] found two new boron-tin minerals: paigeite, which contains about 15 per cent SnO_2, and hulsite, containing about 20 per cent SnO_2. Quartz, fluorite, topaz, and tourmaline are the important gangue minerals.

According to Knopf the cassiterite-bearing lodes occur in a variety of ways:

1. In tourmaline-axinite hornfels.
2. In beds of actinolite rock which are probably interstratified with slates.
3. In tourmalinized margins of granite masses and granitic dikes.
4. In mineralized quartz-porphyry dikes.
5. In quartz stringers cutting slates and limestone.
6. In quartz stringers which cut slates and limestones.
7. At Ear Mountain, in a contact-metamorphosed limestone consisting essentially of tourmaline, axinite, and actinolite.

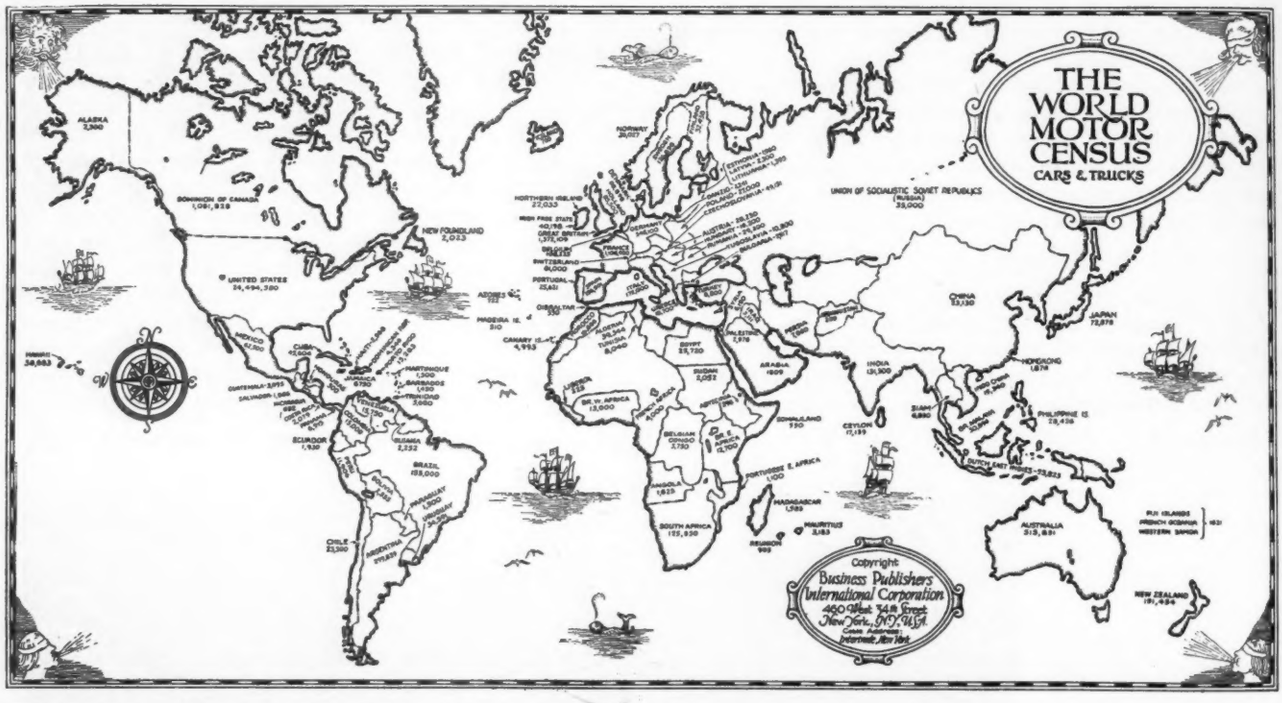
[4]Knopf: p. 23.

Summarizing briefly, there are two areas in Alaska containing commercial deposits of tin. The production to date exceeds $1,000,000, chiefly in the form of placer tin, with the York district credited with approximately two-thirds and the Hot Springs district with one-third. It is estimated that the Hot Springs district contains reserves from which can be recovered about 1,500 tons of metallic tin. This will soon be made available by placing a dredge in the gold-tin bearing gravel.

Placer tin reserves of the York district have been somewhat depleted, so it is expected that future production will come from the development of lode tin deposits in that area that show promise but are still in the prospect stage.

The widespread distribution of stream tin in the gravel of the Yukon-Tanana and Seward Peninsula sections offers some hope that other commercial deposits of tin will be found eventually.

World-Wide Growth of Motor-Car Transportation Insures Increased Consumption of Non-Ferrous Metals



NEARLY thirty-two million automobiles were in use throughout the world on Jan. 1, 1929, according to a motor census taken by *The American Automobile (Overseas Edition)*. This census, which was based on reports from all sections of the world where automobiles are in use, shows a total of 31,929,952 cars and trucks, representing an increase of 2,291,417 units, or 8.6 per cent, as compared with the total of a similar census taken a year previously. The 1929 census is notable in that it shows two countries to have passed, for the first time, the million mark in automobiles in operation. These countries are France and Canada, which, with the United States and Great Britain, make four countries each of which has more than 1,000,000 cars, trucks, and buses in operation. The details follow:

Country	*Automobiles	Cars	Trucks	†Buses	Motorcycles
Africa	278,272	223,578	48,278	2,046	58,368
America (excluding United States)	1,813,762	1,474,617	303,517	4,721	16,541
Asia	416,743	318,077	86,356	7,432	52,871
Europe	4,218,986	2,901,614	1,030,889	111,791	1,851,550
Oceania	707,609	577,852	130,709	.....	126,609
United States	24,494,580	21,289,681	3,113,479	91,420	117,085
Totals	31,929,952	26,785,419	4,713,228	217,410	2,223,024

World increase of automobiles in 1929—2,291,417—8.6 per cent.

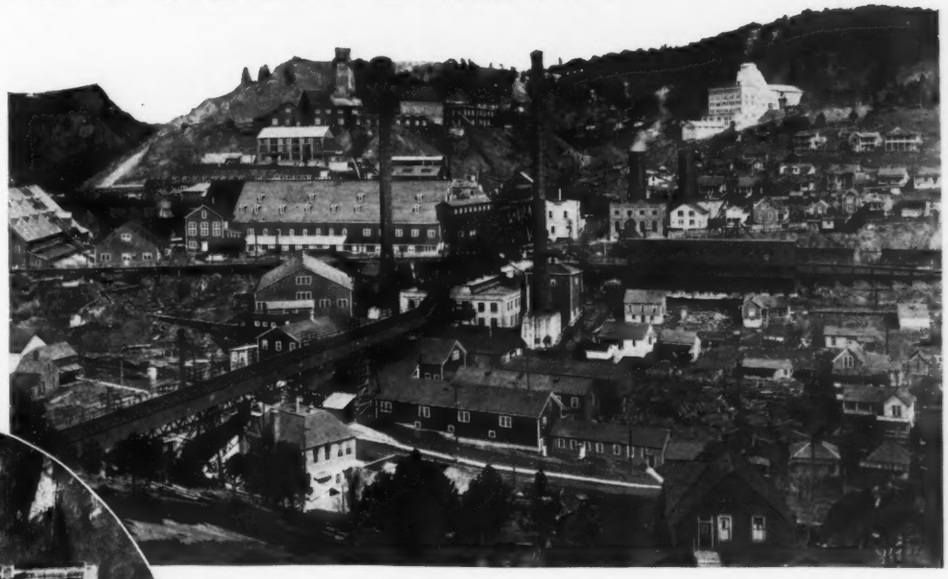
World Increase of automobiles in 1929, excluding United States—1,050,719—16.5 Per Cent.

*Includes cars, trucks, and buses. Motorcycles not included.

†Buses not complete, included as cars or trucks in many countries.

UNDERGROUND *at the* HOMESTAKE

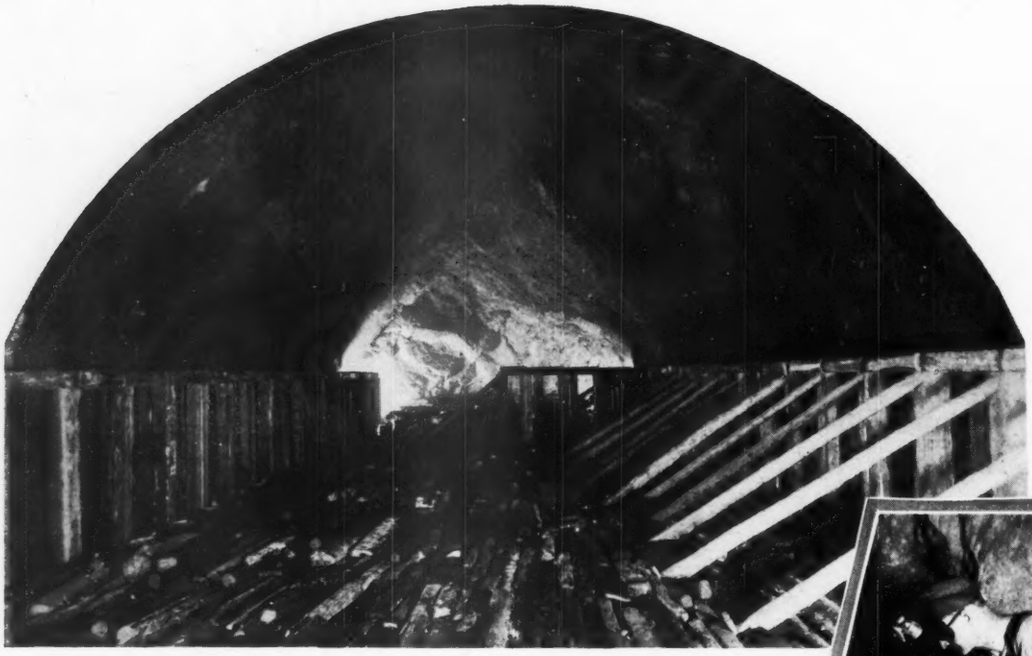
A pictorial story of operations at the property of the Homestake Mining Company, Lead, South Dakota



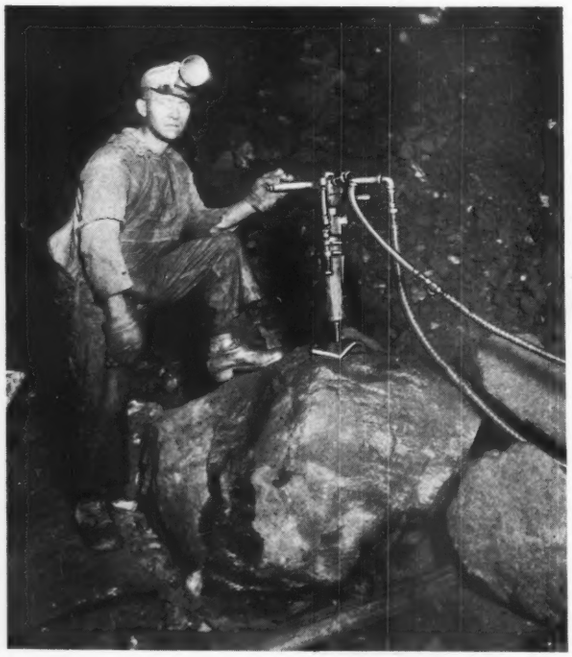
The Homestake is the largest mine in South Dakota, and one of the great gold mines of the world. Last year 1,416,949 tons of ore was milled, realizing an average of $4.63 per ton. Over 15,000,000 tons of ore is blocked out in the mine. The view above is a general one of the surface improvements on the north side of Gold Run Creek at Lead, showing the B. & M. group. This does not include the Ellison hoist, the South stamp mill, nor the cyanide plant adjoining. At the extreme left can be seen a portion of the caved ground resulting from the long-continued operations, extending back to the 'seventies. Mr. B. C. Yates is now general manager.

Timber sets are shown above, in an empty stope alongside of a pillar

The timber sets shown at the left are built on the sill floor

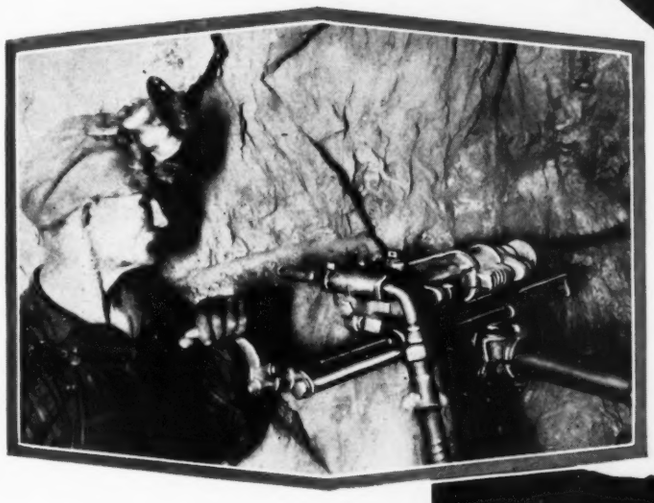


The back of the stope is arched and, after the chutes have drawn all the ore that is possible, the sill floors are cut out. The broken ore remaining in the stope is then shoveled out and the space is filled with waste, with the exception of two chute lines, one on each side of the stope, parallel to the pillars. The view that is reproduced above shows a timber mat on a sill floor, as it has been prepared for waste filling.



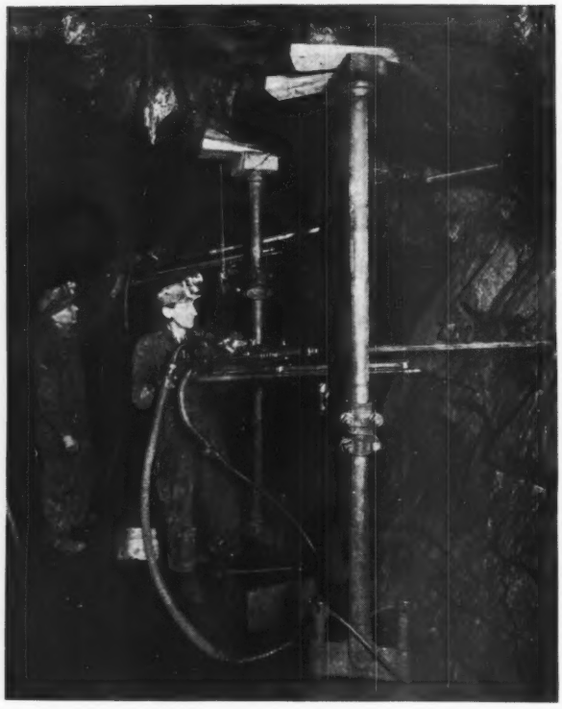
Safety work is well organized: Note the goggles worn when breaking rock through a grizzly. In the Homestake, all large rock must be block-holed, for it is too hard and tough to break with 16-lb. hammers. The block-holer at the left is rated as a miner, and he is shown at work at the muck pile in one of the shrinkage stopes. He is able to block-hole enough ore to keep two or three shovelers busy.

Stripping operations in B. & M. shaft No. 2 are shown at the right. The top section of the original B. & M. shaft was threatened by ground movement, so the B. & M. No. 2 was recently sunk and is now completed to a depth of 60 ft. below the 1,550 level. Until 1900 all mining was done by glory-hole or square-set methods, there being no system of stopes and pillars. Mining is now done by a method of shrinkage stoping.

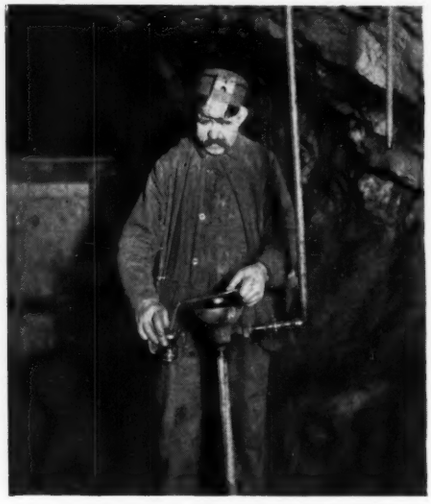


A close-up of one of the small hammer drills used, and its operator. Cleveland No. 5D and Ingersoll-Rand No. 248 are popular here, using 1-in. quarter-octagon hollow drill steel, with straight shanks and double-taper cross bits.

Shovelers at work in a "shovel hole" on the edge of a shrinkage stope are shown at the right. Even these small rocks can be drilled and blasted quicker and cheaper than they can be broken by a man using a 16-lb. hammer. The dry jackhammer shown has now been discarded and the machine shown on the opposite page substituted. The car holds one ton.

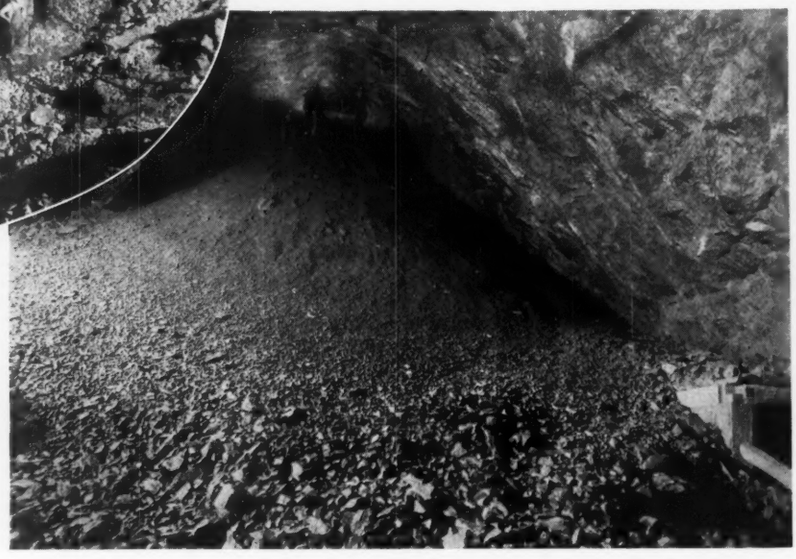


Starting a crosscut toward the orebody from a header that has been driven parallel to the ledge on the hanging-wall side in the country rock. The usual dip of the walls can be seen on the face that is being drilled. The ore occurs in an intensely folded and altered bed of Pre-Cambrian dolomitic limestone, the orebodies being irregular in shape and varying greatly in size.



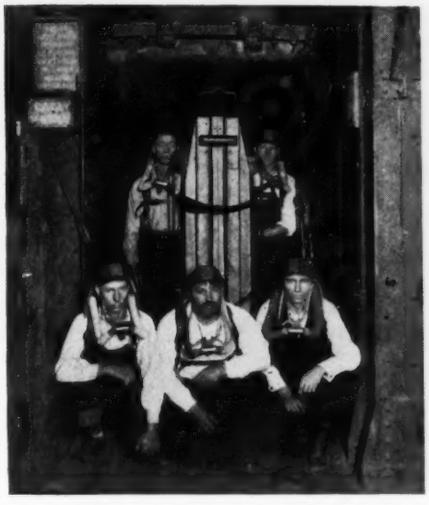
The underground drinking fountains are connected with the city water supply. This car checker is filling his carbide lamp by means of a grooved stick having a small hole through the center. The water comes up through the hole and runs along the groove to the lamp.

Shown below is a view taken from the top of a pile of broken ore in one of the shrinkage stopes. The solid face is that of an ore pillar left to support the walls.



One important stage of the mining operation is filling a stope, as shown at the right, which is a view looking from the footwall toward the hanging wall

A 6x6-ft. raise into a stope. This is used as a "traveling way" for men and supplies, and for ventilation. The small pipe is for water, being connected with the city supply at the top. Each stope is supplied thus. The pipe also makes a good hand rail. The large pipe is for compressed air. The two planks set at an angle form a slide for lowering and hoisting supplies, with the aid of a "tugger" hoist.

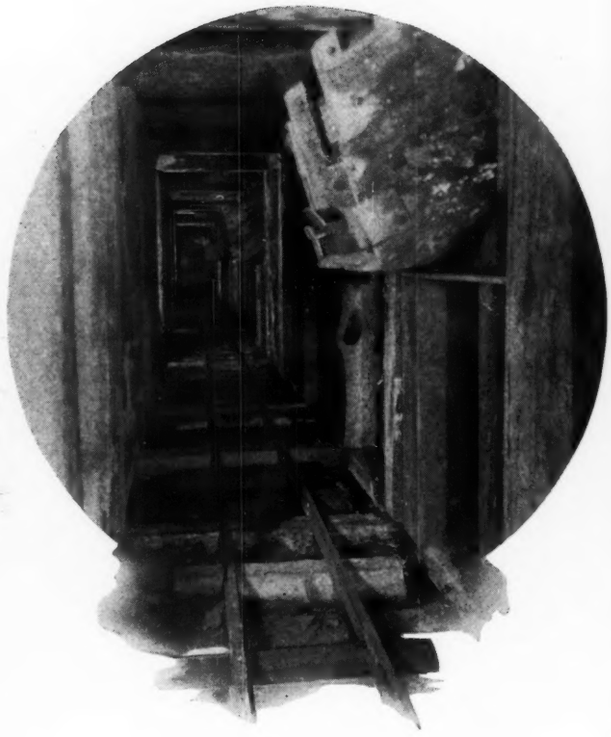


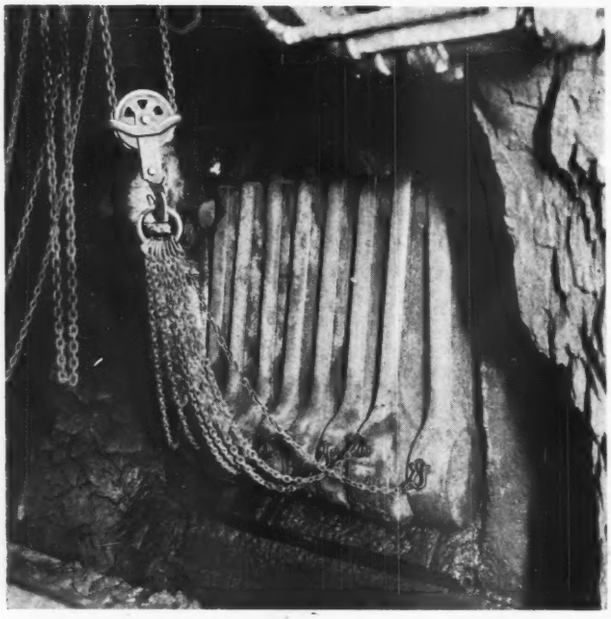
This mine rescue team is trained in the use of gas helmets and first aid. The stretcher is of local design and is built with the idea of fitting all cases underground. Note the iron on top through which a rope can be put; this makes it easy to get a man up a winze or raise. The stretcher body is of wood.

In the oval is a scene in one of the shrinkage stopes. Drillers can be dimly seen working at the face. The method of mining was described in Vol. 72, Transactions A.I.M.E.

The mucker at work in a shrinkage stope. Note his stylish turned-up overalls. All ore in shrinkage stopes used to be handled in this way, by shoveling into one-ton (20 cu.ft.) side-dump cars, but now about three-quarters of the ore is drawn through chutes.

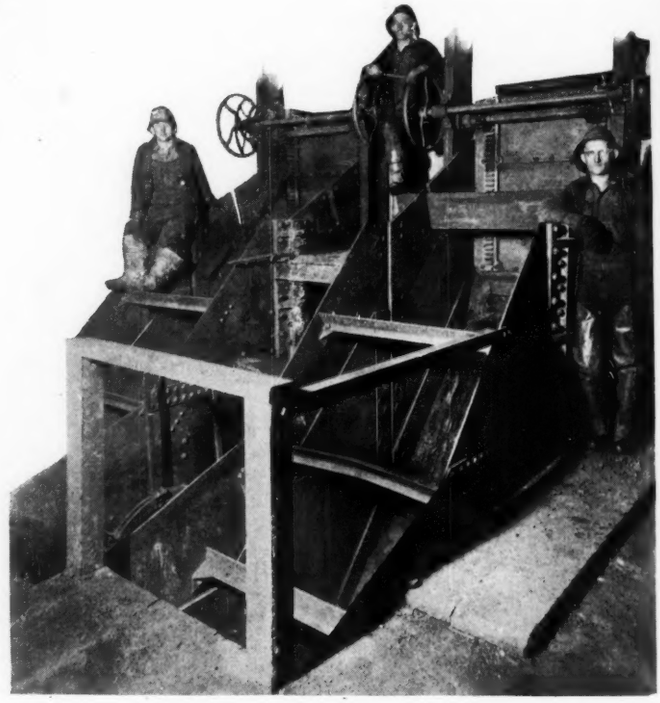
Chutes in a shrinkage stope, looking toward the hanging wall. Part of a solid pillar is on the left. On the right, and behind the timber for 55 ft., is either broken ore or waste, the weight of which keeps the timber braced against the pillar on the left. This stope is 125 ft. high and is full of broken ore ready to be drawn as needed. Above this line is the weight of this stope full of ore; hence the reason for the large timber.





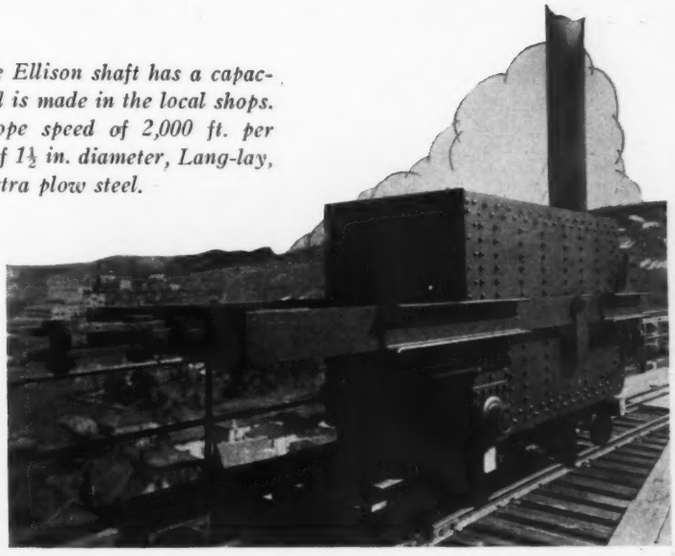
Above: the finger chute installed in a raise for the purpose of passing ore from the levels above (four in this instance) to the underground jaw crusher. The fingers are made of cast iron and are so heavy that a two-ton chain block is used to raise them. The pipes lead upward to cross an I-beam just above. Below each of the three crusher stations in the Ellison shaft is a 1,500-ton ore bin and loading pocket.

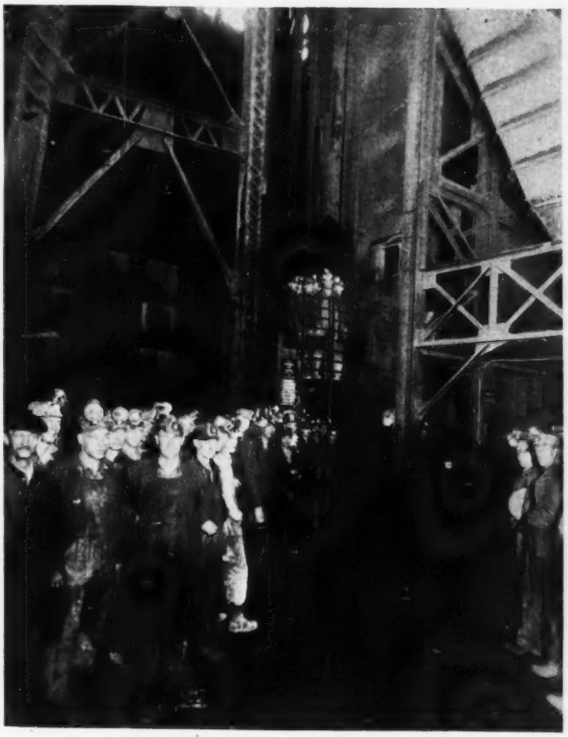
Below is the face of an underground bin which is built of concrete, though it looks like timber; also a measuring cartridge. The back gates are used to regulate the flow of ore and are operated by hand. The other gates, or doors, are operated by compressed air.



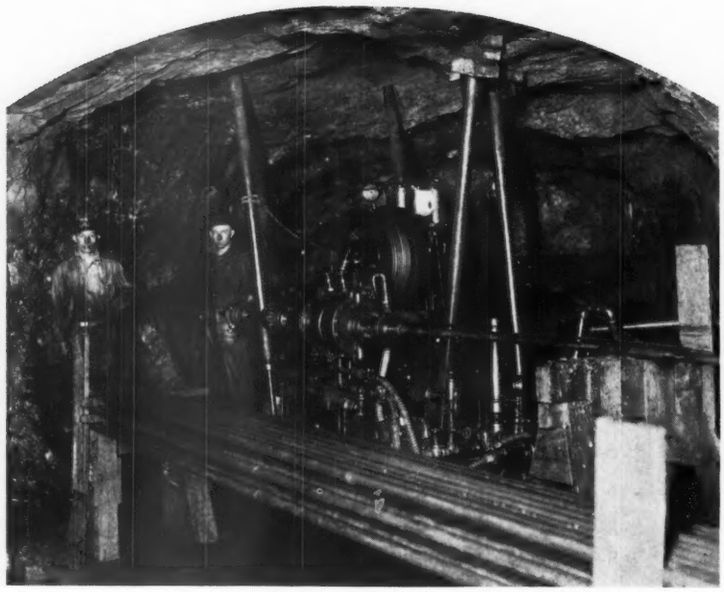
The skip-changing device in the Ellison shaft, at the 2,300 level, is shown at the left. This shaft has five compartments, and is 12x20 ft. outside of timbers. The original cage compartment, now used for supplies, is 5x10, the two skip compartments are 5 ft. 6 in. by 5 ft. 8 in., and there is a pipe- and ladder-way compartment and one for the cage counterweight and electric cables. Allis-Chalmers built the mechanical part of the ore hoist, and General Electric the electrical.

The skip used in the Ellison shaft has a capacity of seven tons and is made in the local shops. The hoist has a rope speed of 2,000 ft. per minute, using rope of 1½ in. diameter, Lang-lay, seal construction, extra plow steel.

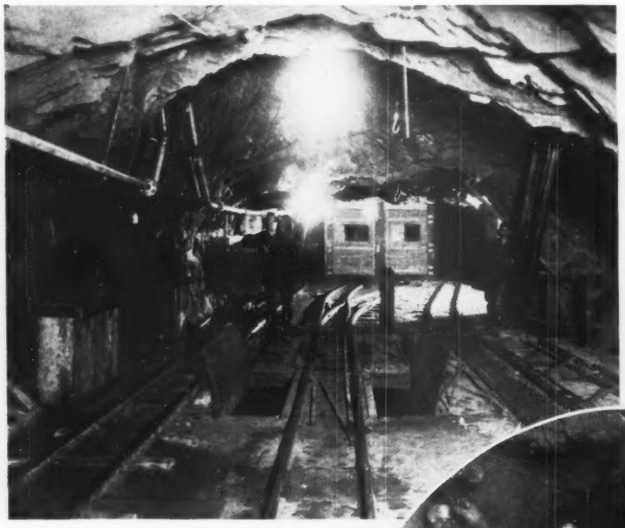


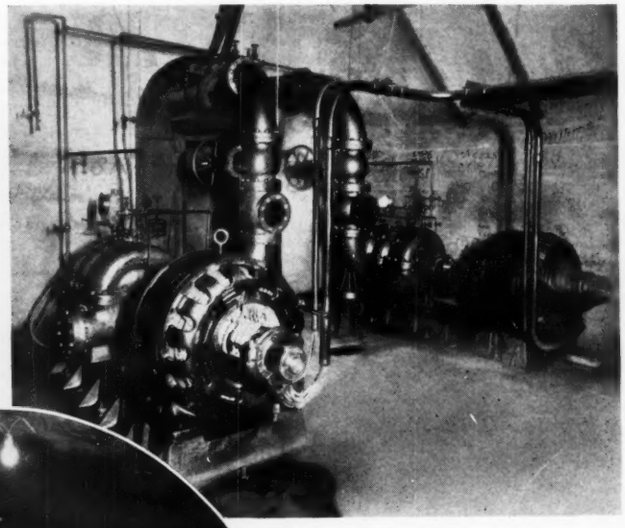


Ellison shaft landing, showing men being lowered into the mine on double-deck cages. Each deck holds sixteen men. The left compartment is used for supplies, mine timber, and similar freight. The two compartments at the right of the shaft are used for hoisting ore after the men have been lowered, the cages being taken off and skips put on, as shown at the top of the page.



Exploration is carried on by drifting, crosscutting, and diamond drilling. One or two diamond-drill rigs are constantly employed to eliminate unprofitable work in the first two categories mentioned. This flashlight shows the equipment, installed underground, for drilling a 1,400-ft. hole. The illustration below, at the left, is a view looking toward the rock dump of an underground crushing plant. Side-dump cars are used, discharging into the holes at either side of the track. Two compartments of the shaft are visible in the background, inclosed so that ventilating air can be controlled. The large pipe carries 90-lb. air for drilling; the small pipe, 900-lb. air for the haulage locomotives.





At this underground charging station, 900-lb. air is being admitted to the receiver of one of the 29 mine locomotives, from which the pressure is reduced to 160 lb. at the cylinders

The pump room on the 800 level of the B. & M. shaft has the inevitable "literature" on the walls. The mine makes about 400 g.p.m., which is pumped in 300-ft. lifts by this equipment.

Recovery of Fine Gold by Amalgamation

By Edmund S. Leaver

Supervising Engineer, Rare and Precious Metals Experiment Station, U. S. Bureau of Mines, Reno, Nev.

IN RESPONSE to the many requests for information on the recovery, or reason for poor recovery, of fine gold by the amalgamation process, the U. S. Bureau of Mines recently prepared an information circular on the subject, a reprint of which follows, in part:

Experience has shown that in many cases the true gold content of a particular sample or deposit has not been determined. Fire assays of representative samples give accurate results and should be considered final. Methods for obtaining representative samples are described in textbooks dealing with mining and ore dressing, copies of which are on file at all universities and in most public libraries. Two of such textbooks are: Richards' "Handbook of Ore Dressing," published by McGraw-Hill Book Company, New York, and Taggart's "Handbook of Ore Dressing," John Wiley & Sons, New York. A list of competent assayers is published in *Engineering and Mining Journal.*

Occurrence of Gold

The best method for recovering gold depends on the form of its occurrence in the material to be handled. An experienced operator can obtain a good idea of the amount of free gold and can tell something as to the fineness of it by careful panning. The sulphides should be separated and cleaned from the free gold and gangue, and then weighed and assayed. If the sulphide carries gold, it is probable that part of the gold in the slimed portion is locked up with sulphides and will not amalgamate. Of course it is advisable, if practicable, to have an expert make a miscroscopic examination to determine what minerals are present and how they are associated in the gangue. Such an examination is needed by the examining mining engineer or metallurgist before he can recommend methods of recovery. A description of the various forms of gold found in nature is listed in textbooks on mineralogy, such as Dana's "Textbook of Mineralogy," published by John Wiley & Sons, New York.

Gold Lost in Amalgamation

Fine gold lost in the usual amalgamation processes is often called "float gold." Most of this gold is probably in the form of thin laminæ, flattened grains, or scales, and its loss is due to non-contact with the mercury. A thinner pulp, provided by the introduction of swinging amalgamated plates as obstructions in the pulp flow, and the stirring action caused by more frequent drops onto the different sections of the amalgamation plates have improved the recovery of such gold. Fine gold is readily recoverable by good contact with the amalgamation plates and should not be confused with the gold included in fine sulphides or in other non-amalgamating forms. More detailed information on float gold is given in Rose's "Metallurgy of Gold," published by Griffin & Company, London, 1915, pages 205 and 206.

Rusty gold is a term that has been adopted to designate gold which, although apparently free, does not readily amalgamate. It is known that a thin film of sulphur, oxide of iron, silica, grease, or other substances may cover the surface of the gold particle and prevent amalgamation. The film is usually attacked by grinding or some form of abrasion and by the use of alkalies or other chemicals to dissolve the grease. Recovery of rusty gold is discussed in the "Cyanide Handbook" by Clennell, published by the McGraw-Hill Book Company, New York; also in Rose's "Metallurgy of Gold," and in Peele's "Mining Engineer's Handbook."

Fine gold which is contained in pyrite does not unite readily with mercury. Most of this gold is recovered with the pyrite concentrate or leached by cyanidation. Tellurides do not give up the contained gold to direct amalgamation. Roasting of pyrite and tellurides improves the condition for amalgamating the gold but does not insure a high recovery. Rose's "Metallurgy of Gold," pages 79 to 208, and Gowland's "Metallurgy of Non-ferrous Metals," page 206, further discuss gold enclosed in pyrite and give the usual metallurgical methods used in the recovery of gold from telluride.

Amalgamation

Silver-plated copper plates are generally used in amalgamation processes to recover free gold from ore. For best results the plates must be kept as clean as possible. Mercury is worked into the surface of the plates until a bright, pasty amalgam is exposed, that readily retains the gold as the ore pulp flows over the surface. To effect amalgamation each particle of gold must come into contact with the mercury; the attempt is made to accomplish this by passing the crushed ore and water in a thin layer over the entire surface of the plates and providing for a drop from each of the plates in the series. An authoritative article by A. W. Allen, descriptive of the various methods of gold recovery by amalgamation, appears in *E.&M.J.*, Vol. 116, 1923, pages 275-280. More details are given in the books by Rose, Gowland, and Egleston and also in Peele's "Mining Engineer's Handbook," or in Taggart's "Handbook of Ore Dressing." The following bulletins give the best California practice and can be obtained from the California State Mining Bureau, Ferry Building, San Francisco: Bulletin 46, "California Gold Mine Practice," by E. B. Preston, 1895; Bulletin 85, "Platinum and Allied Metals," by C. A. Logan, published in 1919.

Good amalgamation conditions are reversed easily by the careless introduction of oils and grease. Soluble sulphides in the ore will darken the mercury and lower the gold recovery. Arsenic and antimony are particularly harmful. Many of the base metals unite with the mercury to form base bullion, or, even worse, cause the mercury to slough off and carry away precious metals. Rose's "Metallurgy of Gold" and Clennell's "Cyanide Handbook" give good advice on the effect of impurities.

Recovery of placer gold is usually made by drift mining on bed rock, hydraulic mining, or dredging. These methods are fully described in the following U. S. Bureau of Mines publications: Bulletin 127, dealing with gold dredging in United States; Bulletins 153 and 257, covering dredging in Alaska; and Technical Papers 121 and 309, on placer mining. The California State Bureau of Mines Bulletin 57, by L. E. Auback, 1913, and Bulletin 92, "Gold Placers of California,"

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by Charles Haley, 1923, discuss gold dredging in California.

Since its introduction, the cyanide method of recovering fine gold from siliceous ores has been the usual method employed for the recovery of gold lost in amalgamation processes. In many plants established recently, cyanidation has entirely supplanted amalgamation for the recovery of fine gold. The theory and practice of cyanidation is well covered in the following publications: "Cyaniding Gold and Silver Ores," by Julian and Smart; "Manual of Cyanidation," by Hamilton; "Chemistry of Cyanide Solutions," by Clennell; "The Cyanide Handbook," by Clennell; and U. S. Bureau of Mines Technical Paper 423, "Cyanide Recovery of Gold and Silver Associated with Arsenic and Antimony in Ores." An extensive bibliography covering gold amalgamation and cyanide processes is given on page 1840 of the 1918 edition of Peele's "Mining Engineer's Handbook."

Before expending any considerable time or money in attempting gold recovery, each prospect should be examined and approved by a competent operator familiar with the particular class of mining necessary, or by a competent mining engineer and metallurgist.

Low-Temperature Cerussite Calcination Studied

MUCH of the lead-carbonate ore found in the Western states is either of too low a grade to be economically mined and shipped to the smelter or else occurs in districts unfortunately situated with respect to transportation facilities, according to Virgil Miller and R. E. Head in a report just published by the U. S. Bureau of Mines. In some districts, distance from smelters, combined with the foregoing conditions, renders the profitable exploitation of these orebodies impossible unless the ore is first beneficiated. A method of roasting such low-grade lead-carbonate ores preliminary to gravity concentration has been developed by the Bureau of Mines at its Intermountain Experiment Station, Salt Lake City, Utah.

The oxidized-lead ores vary materially in composition, many of them possessing characteristics peculiar to particular localities. As a class they are difficult to treat; no method of concentration has been devised that is universally applicable to the many varieties encountered. Obviously, the selection of a process for treating any oxidized-lead ore must be based primarily on the physical, chemical, and mineralogical characteristics of that particular ore and on such factors as cost of mining, operation, and market conditions. Oxidized-lead ores heretofore have been calcined largely at relatively high temperatures, and little attention has been given to calcination at lower temperatures, with special reference to its effect on lead carbonate. Therefore, this work was conducted to obtain data on low-temperature roasting of lead carbonate and to determine the changes produced in gravity and other chracteristics under varying conditions of time and temperature. The investigation was limited to the application of the data resulting from the work on pure lead carbonate to several types of oxidized-lead ore in which the chief lead-bearing mineral was cerussite, or lead carbonate.

The mineral used in the experimental work was nearly pure corussite obtained from the Alta district in Little Cottonwood Canyon, Utah. By analysis, the sample contained 95 per cent of lead carbonate, 5 per cent of silica and lime, and a small amount of water. It was found that lead-carbonate ore when heated at a temperature of 450 deg. to 500 deg. C. liberates carbon dioxide and increases the gravity of the lead mineral enough to permit an effective increase in recovery and to improve the grade of the resulting concentrate. Oxidized ores, in which the major portion of the lead value occurs as lead carbonate associated with siliceous or lime gangue, yield to this treatment under proper temperature conditions. Complete conversion of the lead carbonate to lead oxide can be obtained in one hour at a temperature of 450 deg. to 500 deg. C.

Lead silicates form if the lead carbonate is associated with siliceous gangue material and is heated above 500 deg. C. The formation of lead silicate prevents good extractions of the lead. Heat treatment aids in freeing the lead mineral from other minerals or gangue, because of their respective co-efficients of expansion or chemical reactions, and thus effects an additional increase in recovery and improves the grade of product. Concentration of oxidized ores by calcination and gravity separation has a limited field of application. Some ores, however, can be beneficiated by this treatment. More detailed information is given in Technical Paper 413, "Roasting of Lead-Carbonate Ores Preliminary to Gravity Concentration," which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the nominal price of 10c. per copy.

A. S. & R. a Gigantic Enterprise

SOME conception of the quantity of raw material and labor utilized by one company in the production of non-ferrous metals from their ores may be gained from the following statistics covering operations of the American Smelting & Refining Company during the year ended Dec. 31, 1928.

Number of men employed	26,757
Charge smelted, tons	4,330,508
Bullion refined, tons	1,038,030
Coal consumed, tons	416,351
Coke consumed, tons	386,478
Fuel oil consumed, bbl.	1,706,651
Gas consumed, cu.ft.	5,158,775,000
Ore mined, tons	2,482,998
Coal mined, tons	738,483
Coke produced, tons	340,893

A total of 563,713 tons of copper, or approximately 35 per cent of the North and South American total, was produced at the copper refineries of this company.

COMMENT AND CRITICISM

Shall We Let the Future Take Care of Itself?

To the Editor of "E.&M.J.":

I have read with interest the remarks of Dean Frank H. Probert, in the March 23 issue, on the conservation of mineral resources. Every engineer is interested in the elimination of waste as an industrial loss. Economic demand must provide the urge for conservation. We are making vast strides in both metallurgy and chemistry toward the utilization of what were formerly waste products and are consequently carrying on a progressive conservation policy which, though unorganized, is nevertheless effective.

Viewed broadly, conservation of our resources (I speak particularly of our mineral wealth) is an effort to provide posterity with those things which we consider vital to our welfare. We are prone to regard the world of future centuries through the eyes of our present-day knowledge and to belittle the capacity of future generations to progress beyond our standards of living. No man can review the achievements of the last quarter century without experiencing a thrill at the scientific progress that has been made. No thoughtful man can fail to know that this progress will continue at an increasing rate, nor can one of us now living predict the future 100 years hence.

Why, then, should we view with undue alarm the industrial wastes of today? Those wastes are brought about by the economic demand of the time. They may be avoided tomorrow, should occasion arise. The laying up of wealth for posterity is not conducive to racial progress. Posterity may be trusted to hew its own pathway and to utilize the resources which are then available. I have the utmost of faith in the capacity and ability of future generations to meet any and all conditions with which they may be confronted. If we consume all of the fuel in the next hundred years, other sources of energy will be discovered and utilized. If we conserve this fuel, there will be no economic urge until some later time. We are but postponing the time, and who can say whether it will make any difference if any one of our mineral resources give out a hundred years from now or a thousand?

I have but little respect for conservation as a theory, but I have the utmost of regard for waste elimination or conservation as an economic necessity.

WALTER K. MALLETTE.

Sullivan Mining Company,
Kellogg, Idaho.

[Intelligent conservation does not imply saving at a present economic loss. Before the development of selective flotation, for instance, which has made possible the plant at which Mr. Mallette is employed, the zinc could have been saved in a lead ore, thus conserving it, but it would have cost more than it would have been worth, and therefore was not advisable. But conservation is an ideal which we should keep in mind with a view to developing such processes as selective flotation, which will enable us to recover what are now waste products, to the economic advantage of both the present and future generations.

It is quite true, as Mr. Mallette points out, that we do not know what importance future generations will give to natural resources that we find valuable today, so that predictions of national calamity when the resources of any particular fuel or metal come to an end should not be taken too seriously. And yet, our present civilization and its development is based on an adequate supply of those things that we now consider useful, and until supplies become exhausted it seems likely that their utility will continue, and that their supply should be conserved so far as is economically justified. The metals and fuels used at the dawn of civilization are still employed for the same purposes as they were then, though other uses have, of course, been developed, and many more varieties are now available. —EDITOR.]

Metal Resources Needed for the Next War

To the Editor of "E.&M.J.":

I have read with great interest the paper presented before the San Francisco Section of the A.I.M.E., by Dean Probert and published in your issue of March 23, 1929, entitled "Awaken a National Consciousness in Mining." Possibly my friend Dean Probert and I are dusty old pedagogues for having such thoughts, but I have felt real concern for the future metal situation in this country for some time.

The most disconcerting feature in this regard is the development of geophysical prospecting. Before its development a deeply buried deposit of copper, lead, zinc, or whatever metal it might be, was safe for a good while, but the same cannot now be said of such deposits. These deposits will be discovered and exploited and high-pressure research put to work to develop new uses for the excess metal produced, and thus we go around in a circle—but unlike the mathematical circle, this one will have an end. After our children's children have experienced a war of defense against the outside world without plentiful metal resources to fall back on, they will look on our generation with scorn and derision for having permitted such a situation to develop. Such a war of defense is not impossible by any means; trade is vital, and from the way the export trade of this country is developing it is not going to be long before a good many toes will be stepped on, metaphorically speaking, with the result that our country may be attacked and outside sources of metal entirely cut off.

The South African *Mining and Engineering Journal* published an article in its issue of Feb. 16, 1929, entitled "Northern Rhodesia and World Copper," in which authorities estimating the world's copper output in 1937, in tons, are quoted as follows: United States, 800,000; Chile, 300,000; Africa, 300,000; Canada, 300,000. In 1927, according to the same article, the United States produced slightly over 50 per cent of the world's copper. These figures indicate clearly the point I wish to make, because, although we are producing more than 50 per cent of the world's production (and exporting a good quantity of that production), our ore reserves, developed and potential, compared with the countries named before are not large.

This brief analysis applies only to copper, but it is a fact that we are mining all of our metals as rapidly as possible. Even at the present rate of production, our metal reserves, say in 100 years will be in a sad way. It may not be possible or desirable to conserve our metal deposits in their original ores, but a study of the problem might bring out ways and means to accomplish the purpose after the metals have been produced. J. A. FULTON.

Mackay School of Mines,
Reno, Nevada.

[Mr. Fulton takes an opposite viewpoint from that of Mr. Mallette, as outlined in the accompanying letter. The matter of national defense is still of importance in spite of the efforts being made to achieve world peace, which, incidentally, have been more successful than some pessimists expected. We are inclined to doubt the flat-footed statement that in 100 years the metal reserves of the United States will be "in a sad way." Geophysical prospecting is young, and it seems perfectly possible that in much less than 100 years mineral deposits will be discovered that are totally unsuspected now. Some method of finding them may well be developed that will bear slight resemblance to any known today.—EDITOR.]

READERS of "E.&M.J." are respectfully asked not to send in anonymous communications for publication, but the writer's identity will be suppressed if the request to do so be made.

Book Reviews

The President Examines His Country

THE NEW DAY. *By Herbert Hoover, Stanford University Press, Stanford University, Calif. Pp. 230. Price $3.*

IN READING the usual volume of speeches, particularly if they be political speeches, the oratorical aspects become unnecessary and irritating. Reading has the twofold disadvantage (for the writer) that it affords ample time for careful digestion of the thought and that the reader usually approaches it in a critical frame of mind. Speech, on the other hand, flows glibly on and is not easily detected in its fallacies and contradictions. Printed speeches usually smack of this tendency toward hasty thinking. "The New Day," a collection of the campaign speeches of President Hoover, lacks to an unusual degree the obvious appeals to the emotions of the crowd that stud the usual run of speech and shows no signs whatsoever of hastily collected and superficially convincing data. It is rather the carefully phrased statement of the philosophy of a man who is intrinsically the engineer, cool and dispassionate, and gifted with an eye for comprehensive appraisal of true worth.

The nine speeches contained in this book transcend the momentary issues of the campaign and survey the economic and social structure of a nation. On what is America's economic foundation builded? What are the supports involved, the stresses, the strains? Mr. Hoover has examined the entire structure, and these nine speeches are his report.

Essentially he is an optimist. He has faith in the ability of his fellows and their innate desire for good. That he is not wholly occupied with things politic and economic is attested to by the importance he attaches to America as, essentially, a land of families. He refers, not to our 120,000,000 people, but to our 25,000,000 families. The family is the basic communal unit, and on it depend the social relations of man, which are, in the last analysis, probably his most important relations, though they are by no means independent of others. By speaking of families, rather than individuals, Mr. Hoover emphasizes his tendency to stress the importance of co-operation. Co-operation—within the family, within industry, within government, and among all three of these entities—is the basis of the American system, as he described it in his speech at St. Louis, perhaps the most admirable in the collection.

"These three revolutionary American ideas, political, social, and economic, are interlocked and intermeshed," he declared. "They are dominated and cemented by the ideal and practice of equal opportunity. They constitute one great system protecting our individualism and stimulating initiative and enterprise in our people. This is the American system. One part of it cannot be destroyed without undermining the whole."

Having examined the structure and found it sound, Mr. Hoover is not content to stand still. Certain of our institutions, which are essential to our development, must be retained. But there is much yet to be done. Through the American system, "the moving force of our prosperity," a wide diffusion of the enjoyment of wealth, as well as opportunity, must be obtained. That will mark the dawn of "the new day."

S. D. STRAUSS.

BLAST FURNACE PRACTICE—*By Fred Clements. Ernest Benn, Ltd., London.* [In three volumes. Price £3 3s. per volume.]

IN SPITE of the tremendous importance of the iron blast furnace in the development of modern civilization, the technical literature of the industry has not kept pace with recent practice. The author of the present volume, Mr. Fred Clements, general manager of the Park Gate Iron & Steel Company, Ltd., Rotherham, has chosen a timely moment to produce this monumental work, which should be of great value to students, designers, and operators alike. The book will be issued in three volumes, of which the first was published on Feb. 22, 1929. This volume deals with general principles; the source, preparation, and handling of raw materials. The second will deal with the design of plant and equipment; and the third with operation and the utilization of subsidiary products. The first volume is attractively and substantially bound, is printed on good paper, and is well illustrated with photographic reproductions as well as line drawings.

Much of the information conveyed is evidently based on the author's own personal knowledge and experience, and is therefore of the greatest value. He has drawn liberally from other sources also, both published and unpublished, in all parts of the world. Mr. Clements has succeeded in making the treatise of international scope and interest. He has been particularly happy in analyzing and dividing his subjects, and in preparing tables, supplementing the text, so that the reader can obtain the meat of the subject, when desired, without delving too deeply into details. The details are there, however, for those who need them. The financial side of the technical problems is given its proper weight, something often lacking in technical literature.

A short history of the iron industry and the development of the blast furnace opens the first volume, followed by an outline of the scope of the book and brief descriptions of plants which have been chosen as representative of modern practice in various parts of the world. The next five chapters take up the metallurgical properties of pig iron, the blast furnace and its functions, and the chemical, thermal, and physical principles involved in its operation. These subjects are considered from both the theoretical and practical point of view.

Chapters seven, eight, and nine are devoted to iron ores. After the geological character and occurrence of iron ores and their geographical distribution have been discussed, the ores are again considered in the light of their economic importance, and comprehensive tables are given, showing the present status of the known deposits of the world. Sampling methods are also considered in detail. This is followed by descriptions of the mining methods used in the important ore fields of the world, and of the machinery and equipment used in mining, rock drills and loading machines receiving the greatest amount of attention.

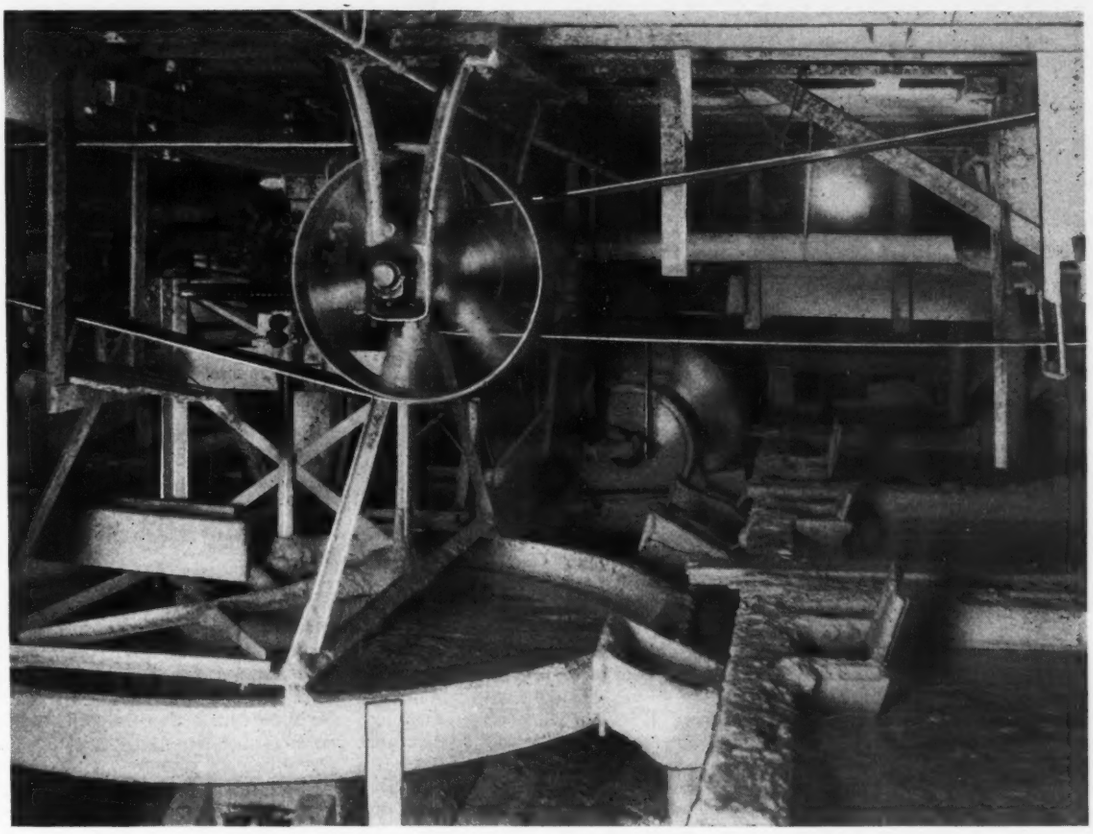
The next chapter covers the subject of the preparation of ores for smelting —that is, crushing, drying, screening, washing, concentrating, briqueting, nodulizing, and calcining, and descriptions are given of plants in various parts of the world. This is followed by a short chapter on fluxes and iron-bearing auxiliaries of the burden, and longer chapters on the production of blast-furnace coke and the functions of the air blast. Detailed descriptions of the methods used in modern plants for the production of blast-furnace coke in representative iron centers are given, and are well illustrated with plans and photographs.

The final chapter is devoted to the handling of materials, particularly transport systems, and descriptions are given of ore docks, loading and unloading machinery, ore cars, ore boats, ore bridges and storage piles, exemplifying modern practice in the United States and Canada, Great Britain and Continental Europe, northern Africa, Australia, and Japan.

There are also large supplementary sheets, giving dimensions and general data and the principal points of the design of blast furnaces and coke ovens at important works, which should be particularly valuable to designers and architects. The value of the volume is enhanced by an unusually detailed table of contents and a handy index, which make it useful as a book of reference.

If the second and third volumes are as good as the first, Mr. Clements may be congratulated on having made a distinct contribution to the technical literature of his industry. LUCIEN EATON.

INDUSTRIAL PROGRESS



Bowl classifier and ball mill preparing 350-mesh whiting at Benj. Moore Company's plant

Modernized Treatment Improves Results in a Non-Metallic Industry—II

By A. Anable

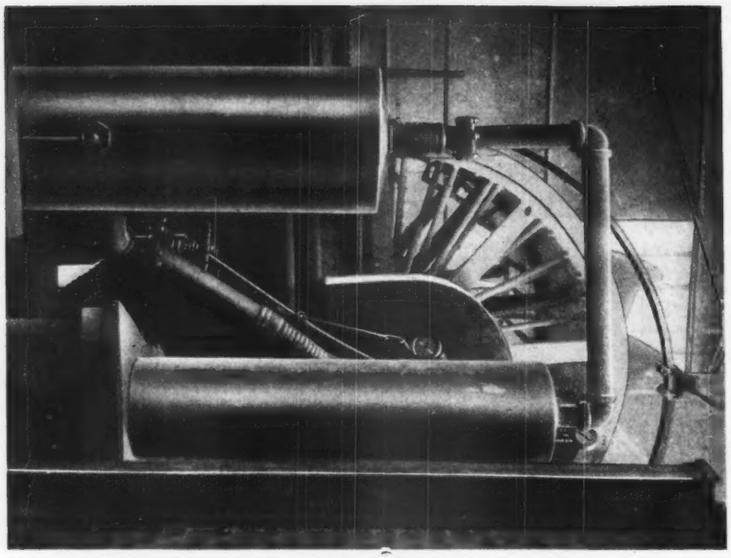
The Dorr Company, New York

THE Florida China Clay Company, Leesburg, Fla., is washing china clay by passing the clay slip through a long series of troughs (see the illustration on p. 566, *E.&M.J.*, April 6, 1929) in which sand and other impurities are settled. The refined clay discharged from these troughs was formerly settled intermittently in a rectangular concrete tank 50 ft. in diameter and 150 ft. long. In 1925, the company purchased a spray drier for dewatering the settled clay. In order that the settled material might be fed to this drier on a continuous basis, a 50-ft. diameter thickener was purchased and installed in the center of the tank. This has been working satisfactorily. It has since been found entirely feasible to feed the drier at a uniform rate with a sludge having a solid content of from 28 to 35 per cent.

In 1926, the N. G. Smith Company, a clay producer at Spruce Pine, N. C., substituted a classifier for its settling flume. The original layout of the plant

Operating Result for Bowl Classifier on North Carolina Kaolin

Tonnage handled	3 tons finished clay per hour. About same amount fine sand.
Dilution (water solids by weight) of overflow	50 : 1
Character overflow	95-98 per cent minus 325 mesh (plus 325 mesh almost all mica)
Character rake product	70-80 per cent plus 325 mesh (not more than 3 to 5 per cent actual clay)
Bowl speed	1 r.p.m.
Reciprocating rake speed	12 strokes per minute.
Power consumption	2 hp.
Operating attention	One half one man's time. Supervisory only.
Uniformity of product	Maintained by uniform hydraulic and mechanical conditions.
Control of product	By variation of wash water and change of mechanism speed or both.



A continuous rotary filter dewatering thickened whiting, preparatory to drying, at plant of Benj. Moore Company, Cateret, N. J.

followed the conventional lines of North Carolina practice.[1] The kaolin was washed from the bank by an hydraulic nozzle, blunged with additional water in a beater, and passed through sand wheels and a drag scraper for the removal of coarse material. It was then run through several hundred feet of trough to separate the fine sand. Fine screens just ahead of the settling tanks removed the fine mica, and the thickened discharge from the settling tanks was further dewatered on filter presses, the cake from which was dried and disintegrated for shipment. This kaolin, it should be said, is associated with a larger amount of free silica than is usually present in such material. The deposit, moveover, like other primary deposits in North Carolina, contains much larger percentages of mica, quartz, and partly decomposed feldspar than the average deposit in the Aiken, S. C., and Macon, Ga. districts. Only about 20 per cent of it, as mined, is true clay. Accordingly, the amount of material settled out in the trough was large and required the attention of several men for cleaning. It was in connection with the removal of the fine sand that improvements were desired, not only because the troughs were costly to operate, but also because a considerable proportion of the clay settled with the finest sand and was lost when the troughs were cleaned out.

The classifier substituted by the company had a 25-ft. bowl. This was installed after tests had demonstrated that the finished product contained less fine sand and was proportionately stronger than the clay being treated in the troughs; also that the loss of clay in the sand reject was reduced to 3 per cent. In the first six months of its operation many points of interest were developed. The operating results for this period are given in the accompanying table.

[1] "Dorr Classifiers for Clay Washing," A. Anable.

The installation of the classifier relieved three men per shift who formerly were engaged in tending to the troughs. At least two tons of finished clay was saved per day, moreover, which had formerly been thrown away.

Possibilities of manufacturing commercial alum from the C. W. Humphrey Company's blue and red fireclay at Sayreville, N. J., were investigated in 1927. These appearing favorable, the company ordered a complete alum plant, consisting of agitators and thickeners arranged for continuous agitation and continuous counter-current decantation. This particular clay deposit contained a large amount of silica and iron, and, based upon elutriation tests, the actual clay content was only 38 per cent. The operator accordingly decided that it would be beneficial to wash his clay before alum manufacture—first, because the iron present would contaminate the finished alum product; second, because the large amount of silica present might cause difficulty in handling and subsequent disposal.

Some commercial tests were run, using a small bowl classifier and making separations at 100, 200, and 250 mesh. It was found that a clean-cut 100-mesh separation would remove the bulk of the impurities, and accordingly the Humphrey company purchased the following equipment for handling 300 tons of clay per 24 hours: one bowl classifier 4 ft. 6 in. wide x 28 ft. long equipped with an 18-ft. diameter bowl; one traction-type thickener 150 ft. in diameter; and one Dorrco filter 12 ft. in diameter x 16 ft. long.

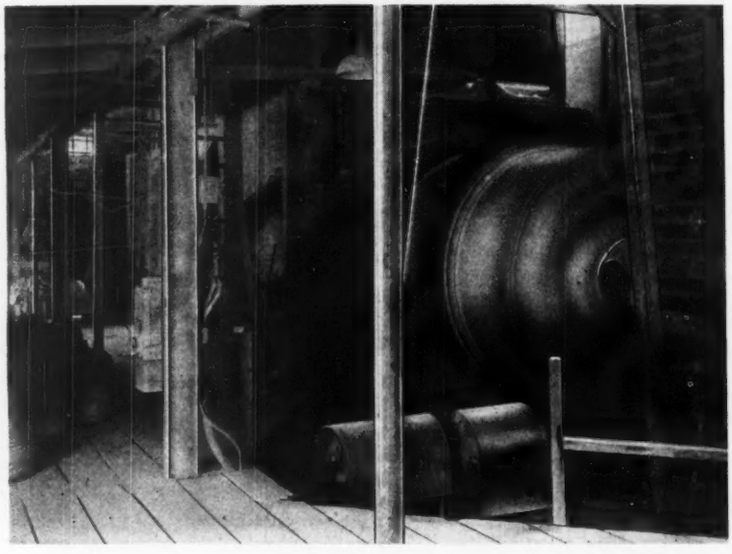
The type of clay to be treated is extremely amenable to classification and settling, which accounts for the fact that relatively small equipment will be used for handling this large tonnage. According to some commercial-scale investigations, the desired separation may be made at a dilution of 20:1 and the thickened underflow may be reduced to 40 per cent moisture on the filter. A Vulcan kiln has been purchased for drying and calcining the filter cake, which latter operation is essential for the proper manufacture of alum from clay.

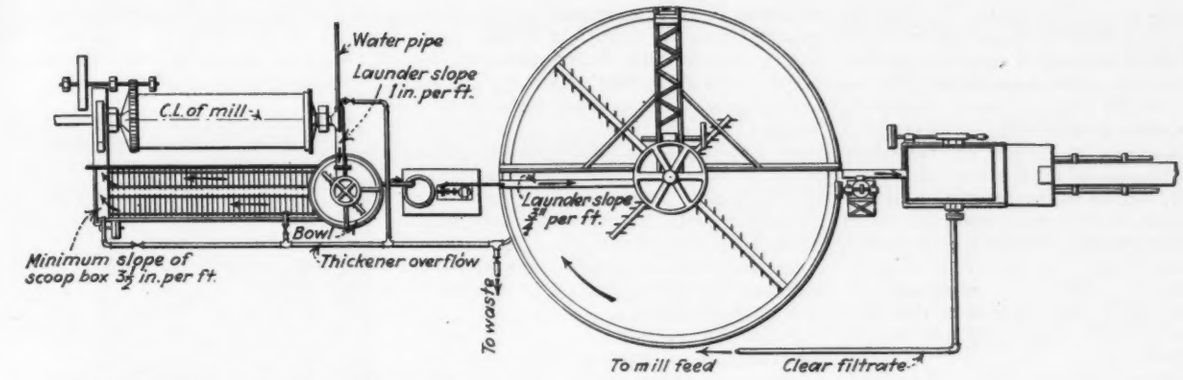
Advantage of Modern Equipment in the Clay Industry

To one who is conversant with modern metallurgical equipment and with the history of its development, it will appear self-evident that continuous equipment of the sort mentioned should be superior to the old units which have so long been used in the clay industry, inasmuch as practically the same arguments may be advanced in the case of clay washing as in metallurgical work.

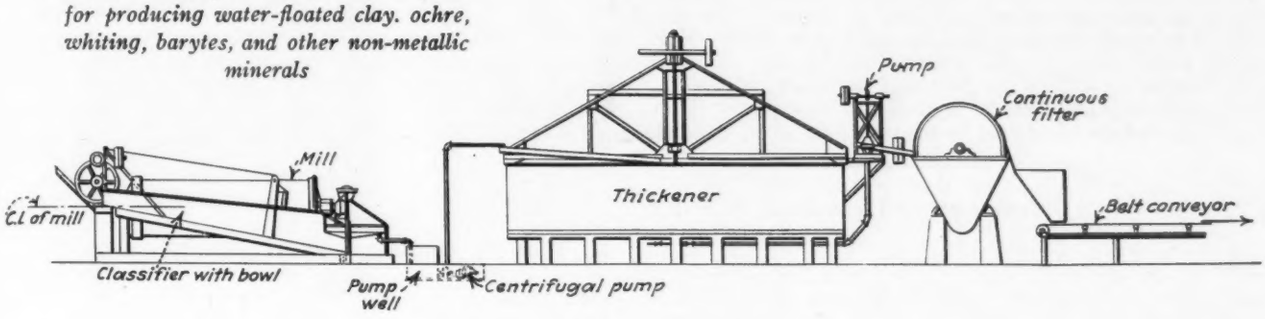
At first thought, clay may seem too cheap a material to warrant costly methods of treatment, but this is really not the fact, since the refined clay such as made by N. G. Smith sells for $16

An oil-fired rotary drier for drying whiting at plant of Benj. Moore Company, Carteret, N. J.





General arrangement of modern plant for producing water-floated clay, ochre, whiting, barytes, and other non-metallic minerals

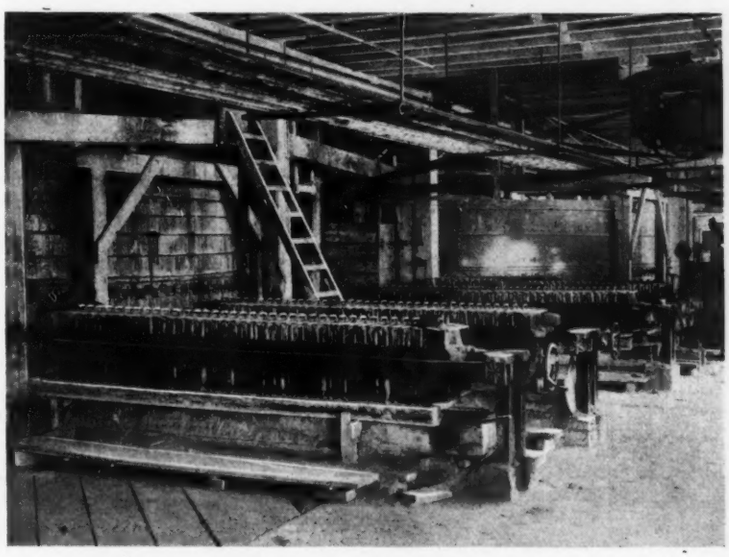


a ton and accordingly compares favorably with the value of other mineral ores which require more elaborate treatment to unlock the valuable constituents. Taking up in turn each of the units mentioned in this article, the following may be said as to their advantages:

The bowl classifier replaces the long, wood settling troughs, sometimes 700 to 1,000 ft. long, which were formerly used for settling out the silica, pyrite, and other impurities. That the bowl classifier can be adjusted to give a clean-cut separation at any mesh from 35 to 350 has been demonstrated. Owing to the washing effected by the reciprocating rakes and the water applied in the rake compartment, the impurities may be discharged as a rake product virtually free from adhering clay. The classifier is, of course, automatic and self-cleaning, and it is used in clay-washing plants in place of troughs. Adoption of it has usually resulted in the elimination of one or more laborers formerly employed in cleaning the troughs.

The thickener replaces intermittent settling tanks of the conventional type. It finds its chief field of usefulness in those clay plants which operate continuously and make use of modern filtration and drying equipment following sedimentation. Rotary filters naturally work at their highest efficiency when they receive a continuous feed of uniform moisture content. Likewise, steam-heated drum driers and spray driers require consistent and uniform density conditions in their feed. The continuous thickener also eliminates any labor for cleaning and makes it possible to return for re-use in the plant the bulk of the water used and at a uniform rate as needed.

Filter presses formerly used at Benj. Moore Company's plant, Carteret, N. J., for filtering whiting. These have been abandoned since the adoption of continuous vacuum filtration. Thickeners for settling water-floated whiting are seen in the background.



As for rotary vacuum filtration in general, as contrasted with filter pressing, spray drying, and drying on steam-heated drums, the engineers in touch with operations in power industries, in the course of their work in the chemical and industrial fields, have made innumerable investigations on the unit cost of drying, following sedimentation, and in practically every case have found, many of them declare, that the lowest costs are obtained with the thickener, vacuum filter, and kiln drier combination, each one of these units operating over the range of its maximum efficiency in accordance with the best principles of stage treatment. Numerous installations may be mentioned as instances of the soundness of this theory, such as plants treating whiting, lithopone, blanc fixe, red iron oxide, and other finely divided products of this sort.

The vacuum filter of course operates ideally in conjunction with a continuous thickener, is much simpler to handle than the filter press, much less costly to operate, and requires very little labor.

The steam-heated drum drier has been used extensively in the Cartersville, Ga. ochre district and in other pigment centers in the South. It is extremely cheap in first cost, but is much more costly to operate than the filter-drier

combination. This can be proved readily on a thermal basis by calculating the total amount of heat units in the form of steam which must be supplied to reduce the 40 per cent solid slurry to bone-dryness in a single operation.

Spray driers have been introduced in several instances in the clay products industry, but, as in the utilization of the drum drier, they depend upon the complete evaporation of water in a single operation from a wet slurry to a bone-dry powder. The cost to operate is probably slightly less, it is said, than the expense involved in the operation of the drum drier.

The accompanying drawing shows the present approved system for preparing a finely divided water-floated material. It should be stated, however, that the classifier would work in open circuit with the blunger or mill in the treatment of clay when impurities are to be removed from the system. It would be operated in close circuit when all of the raw material was of value and needed only fine grinding and water flotation to prepare it for the market.

The general flow sheet here recommended for clay-washing practice has been applied successfully to a great many industrial preparation processes, all of which have this in common: First, the material must be finely pulverized in wet-grinding mills; second, it must be classified to a definite size specification; third, it must be marketed in a bone-dry form.

Following is a partial list of such materials thus prepared: Ochre (paint pigment); sienna (paint pigment); whiting (pulverized chalk used in calcimine); barytes (paint pigment); red iron oxide (paint pigment); lithopone (basis of non-lead white paints); silica; dolomitic limestone; carborundum power (abrasive paper); and aloxite powder (abrasive powder).

New Safety Crosshead Designed

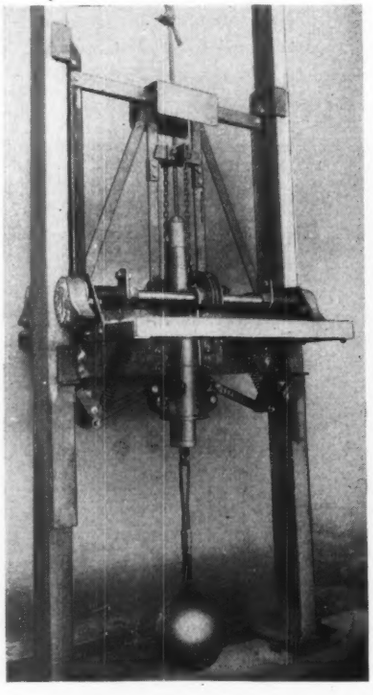
A NEW safety crosshead for shaft-sinking operations has been placed upon the market by the Joshua Hendy Iron Works, of San Francisco. The original design was evolved by Frank W. Collins in response to an order from the Treadwell Yukon Company for its Tybo mine, in Nevada. The accompanying illustrations show the crosshead after assembly and while being tested out in the shop. It was subsequently placed in service at Tybo and is understood to have been in satisfactory service for four or five months.

The safety crosshead should meet two important conditions if a rope should break: it should catch and hold itself to the guides and should prevent the bucket from dropping. In the design, the first condition is reasonably satisfied by the usual safety dogs which will engage the guides if the rope breaks. The safety dogs are thrown into action by a series of coiled springs shown above the platform and otherwise are kept free from the guides by chains attached to segments and under tension by the rope socket which bears against a conical depression in the smaller crosshead to which the chains are attached, as shown in Fig. 1. This smaller crosshead is held by stops riveted to the frame of the crosshead, and at its upper range of travel, when the safety dogs are disengaged, bears against the upper cross member of the crosshead frame.

Under normal operation, when the safety crosshead reaches its lower limit of descent and is held by the stops upon the ends of the guide timbers, the rope socket is released by the "release dogs" shown in Fig. 2 just as they touch the tops and before the runners have reached their resting points. The rope socket is shown in its released position in Fig. 1. It and the attached bucket then travel to the bottom of the shaft. On the return trip, the rope socket enters the crosshead frame and first releases the safety dogs, and as soon as the crosshead is lifted from, and is clear of, the stop blocks, the locking dogs are thrown under the bottom of the rope socket by the lower springs and hold it securely during the remainder of the hoist.

The weight of the crosshead is 980 lb. It is built about a steel casting which carries the platform and below which is a bell-shaped projection, through which the long, pipelike rope socket is guided. The lower runners are attached to the steel casting and the upper runners to steel angles. Diagonals and crossbars stiffen the frame. The design has the merit of simplicity.

Fig. 1. Crosshead resting on stop blocks and bucket descending after being released by rotation of locking dogs out of position. The 250-lb. iron ball was used to replace the bucket.



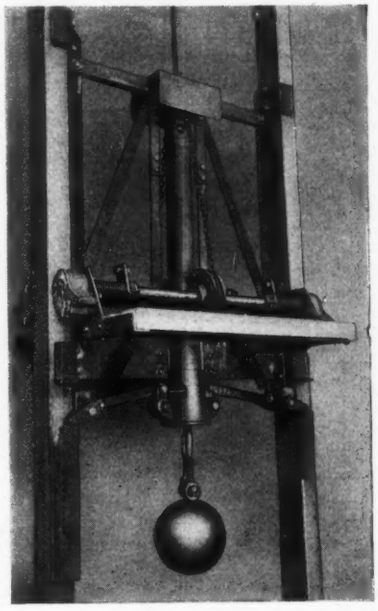


Fig. 2. Crosshead in position for hoisting.

In making the shop tests, the platform was loaded with 800 lb. and a trip hook was used for releasing the rope. As a result of some 30 tests, it was found that the safety dogs would hold the cage within less travel than $\frac{1}{4}$ in. from its position when the hook was dropped.

INDUSTRIAL NOTES

The board of directors of the Joseph Dixon Crucible Company, Jersey City, N. J., at their last regular meeting elected Henry W. Armstrong treasurer of the company to succeed the late William Koester.

Johns-Manville Corporation has purchased the Weaver-Henry Manufacturing Company of Los Angeles, Calif. The Weaver-Henry company manufactures asphalt composition shingles and roofings. The purchase gives the Johns-Mansville another plant in the southern California area.

P. S. Jones has been appointed manager of the New York district office of Cutler-Hammer, Inc. Mr. Jones was formerly manager of the Pittsburgh office of Cutler-Hammer. T. S. Towle, formerly sales engineer of the Pittsburgh office, becomes manager there. G. E. Hunt has been placed in charge of distributors' sales for Cutler-Hammer.

Bucyrus-Erie announces the moving of its Chicago district office to 105 West Adams St., 1312 Bankers Building, Chicago. The Bucyrus-Erie Company's complete line will be handled by A. R. Hance for machines larger than one and one-quarter yards, and by W. K. Fawcett for one and one-quarter yard machines and smaller.

Personal Notes

Roy H. Elliott, San Francisco mining engineer, has returned from Panama.

Charles Janin, consulting mining engineer, of San Francisco, recently left for London.

Louis A. Wright, consulting engineer, of San Mateo, Calif., has returned to his home from New York.

Charles D. Skillings has returned to Duluth after a trip of three months through Western mining districts.

Fred Searls, Jr., vice-president of the Newmont Mining Company, was a recent visitor in Bisbee and Jerome, Ariz.

Matthew C. Brush and **Charles E. Adams** have been elected to the board of directors of the Vanadium Corporation of America.

Thorold Field, mining engineer, who has been active in the development of Rhodesian copper fields, recently sailed from New York for London.

E. S. Berry, consulting mining engineer, of New York City, returned last Saturday on the "Leviathan" from a month's business trip to London.

Dr. **Elmer Ambrose Sperry** has been elected a member with distinction in Tau Beta Pi. This is an honor that has been conferred only once before.

W. G. Green is now in the Basin district of Montana, inspecting the properties of Basin Montana Tunnel. He represents New York and Chicago interests.

Harry Meadows, American mining engineer, was shot by Mexican bandits 43 miles from Magdalena, Sonora, on April 2. He was wounded in the shoulder and leg.

Dan Drumheller will be in charge of mining operations at the Mineral Point property of the Coeur d'Alene Mines Corporation, where work will be started in the near future.

J. D. McKenzie, manager of the East Helena lead smelter, recently addressed the students of the Montana State School of Mines on "Modern Lead Smelting Practice."

Edson S. Pettis has resigned as mill superintendent at the property of Central Manitoba Mines, Ltd., at Wadhope, Manitoba, Canada, and is now in Ecuador, South America.

Edward H. Clark, president of Homestake Mining and vice-president of Cerro de Pasco Copper, has been elected president of Cerro de Pasco, to succeed L. T. Haggin, who died recently.

G. C. Riddell left for South America on April 10, on board the "Carabobo." He is going to Panama and Venezuela for two or three months to examine several mining properties in those countries.

H. E. LaTendresse, geologist and mining engineer, sailed on the "Olympic" for London recently. He will go from London to Northern Rhodesia to represent American interests in the copper areas.

Frank Cullen is in charge of mill operations at the new concentrator on Cottonwood Creek, near Crestone, Colo., which was started recently. It treats ore from the Star and Independence groups.

Erle V. Daveler, manager of Butte & Superior Mining, has been appointed a member of the Board of Education of the State of Montana. This board is composed of three members, who have

ERLE V. DAVELER

supervision over all the educational institutions in the state. Although Mr. Daveler is a Republican, he was appointed by a Democratic Governor. Mr. Daveler, who is also a director of the A.I.M.E., was born in Denver in 1885; graduated from the University of California in 1907, having taken a course in mining engineering; and practiced for some time in Tonopah and various California mining districts. In 1909 he entered the metallurgical department of Utah Copper, at Garfield, Utah, and eventually became assistant superintendent. In 1913 he was appointed mill superintendent of the Alaska Gold Mines Company, at Juneau, Alaska, and in 1917 he was appointed mill superintendent of Butte & Superior Mining. He was made general superintendent of the company in 1920 and general manager in 1925. At present he is in New York on a visit.

Percy F. Minister, geologist, of the East Butte Copper Company, recently spoke before the students of the Montana State School of Mines, at Butte, on the production of limestone in the United States.

George Eubanks will be in charge of sinking the new shaft at the Matahambre mine, Pinar del Rio, Cuba, owned by American Metal. The E. J. Longyear Company will do this work on a contract basis.

J. Richard Brown, mining engineer, of Spokane, has been elected president and general manager of the Deer Trail Monitor Mines Company, recently formed to operate in the Deer Trail district, Stevens County, Wash.

Glenn L. Allen, metallurgical engineer for San Francisco Mines of Mexico, Ltd., arrived at New York from London on the "Leviathan" on April 6. While in Europe Mr. Allen visited important Belgian metallurgical works.

Samuel Barker, Jr., managing director of Basin Montana Tunnel, and consulting engineer for Butte Copper & Zinc, has returned to his headquarters at Butte after a trip to the Tri-State district, where he examined several properties.

Karl B. Geib, engineer, of the Molybdenum Corporation of America, will make an examination of the molybdenum discovery on Mineral Hill, at Conconully, Wash. The property is owned by the Lone Star Mining & Development Company.

Samuel Fischer, formerly at the Andes smelter, at Potrerillos, and more recently in charge of the smelter of the Compañia de Minas de Cobre de Gatico, near Antofagasta, has returned to the United States from Chile and is now in New York City.

George N. Bennett, formerly chief engineer with Butte & Superior Mining, is one of a group of Butte men who have organized Butte Black Warrior Mining to operate the Montana-Black Warrior group of claims in the Burlington section of Butte, Mont.

Lieutenant-Colonel **H. H. Yuill,** representative for the Victoria Syndicate, of London, in British Columbia, has been elected president of Galena Farm Consolidated Mines, which will operate the Galena Farm, Hazard, and Hewitt mines, near Silverton, B. C.

S. T. Nicholson, president, and **L. F. Mitten,** sales engineer, of the Vulcan Iron Works, Wilkes-Barre, Pa., have just returned to that city after an automobile trip through the Southwest, where they visited mining operations in Arizona and New Mexico.

Frederick F. Laist, head of the metallurgical department of Anaconda Copper, has announced that he will hereafter make his headquarters at New York City instead of at Anaconda. **L. V. Bender** will take charge of operation at the Washoe smelter, at Anaconda.

Charles Alaniva has been made superintendent for Nelson Mining at the Greenway mine, on the Mesabi range, in Minnesota. Mr. Alaniva has previously been connected with Homestake Mining, at Lead, S. D., and with Great Northern Iron Ore, also in the Lake Superior country.

T. L. Carnahan, Henry B. Hanson, and **J. W. Reid,** who had been captured by Mexican bandits within the last month and held for ransom, have been released. Mr. Carnahan, an El Paso mining engineer, was kidnapped at the La Noria mine, near San Benito, Zacatecas, on March 18, and held for a ransom of 30,000 pesos. He was rescued early in April by Mexican federal troops after 10,000 pesos of the ransom had been paid on account. Mr. Hanson and Mr. Reid were kidnapped at the San Nicolas mine, near Vacas, Durango, on March 1.

NEWS OF THE WEEK

Summary

ENGINEERS' estimates place the life of the Mohawk mine, in the Michigan district, at about six or seven years, but the company has a potential reserve in the Michigan mine, which is not operating at present. Page 614.

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Luiri Gold has developed a small gold mine at Matala Hill, in the Rhodesian copper district, and has, in addition, other prospects in its concession areas. Operations at Matala Hill are now on a basis of 50 tons daily. Page 615.

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Grandview Mines is operating its 350-ton concentrator near Metaline Falls, Wash., on low-grade lead-zinc ore. The company intends to bring daily tonnage up to 2,400 tons eventually. Page 613.

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Down Town Mines will reopen its properties at Leadville, Colo., this summer. These mines were formerly the largest producers in the district. Page 614.

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Arizona Metals will build a 600-ton leaching plant at its Zonia mine, near Kirkland, Ariz., to treat ore averaging 1.84 per cent copper. Page 612.

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Three adjoining properties in the Silverton district of British Columbia, have been consolidated by the Victoria Syndicate, of London. A 150-ton concentrator will be built by the new company, which will be known as Galena Farm Consolidated. Page 616.

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Falconbridge Nickel is hastening the work of sinking its shaft to 1,000 ft. at its mine, near Sudbury, Ont. During March, it was deepened 255 ft. to the 627-ft. point. Page 616.

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Constitution Mining & Milling has its new electric hoist in operation on the main shaft of its mine in the Coeur d'Alene distict of Idaho. Page 611.

Needs of Mining Industry Set Forth in New Bulletin, Just Published

By Paul Wooton
Special Washington Correspondent

PRINTED copies of the recent hearing on the needs of the mining industry before the Senate Committee on Mines and Mining have just become available. This is regarded as an important contribution to mining literature. The printed record of the hearings covers 98 pages and includes the statements of Scott Turner, Director of the U. S. Bureau of Mines; of W. C. Mendenhall, chief geologist, U. S. Geological Survey; H. A. Beuhler, director of the Bureau of Geology and Mines of Missouri; of George H. Ashley, state geologist of Pennsylvania; and of E. F. Bean, state geologist of Wisconsin.

In addition the record contains a number of letters from representative individuals in the mining industry commenting on the service which the Bureau of Mines has rendered. There is an extended statement from the American Petroleum Institute dealing with the necessity for more research work in connection with petroleum and natural-gas resources and a summary by Senator Oddie, of Nevada, of the budget situation. The text of this latter statement follows, in part:

"The summarized financial statements of the Bureau of the Budget do not segregate and group properly governmental expenditures. Inasmuch as these summarized annual statements are the ones which receive publicity, the public is merely informed that so much money has (or has not) been saved, with no information as to which expenditures are for maintaining and expanding necessary governmental activities and which are for operating expense. While it is true that the details of these recapitulated expenditures are carried in the body of the budget statement, it is also true that no attempt is made in these detailed statements to analyze or segregate the items along the lines above referred to. It is obvious that such a system of reporting these expenditures does not provide a true index of economy. . . .

"Let us assume that a reduction of governmental expenditures makes it impossible—as it has—for the Bureau of Mines adequately to safeguard the lives of miners or to develop and maintain technical research to a point at which the mining industry would be enabled to successfully function in the domestic field and to meet foreign competition. Here again it is obvious that a reduction in governmental expenditures could not be regarded as true national economy.

"Let us also assume that a reduction made by the Budget Bureau in total governmental expenditures should materially lessen, as it has, the activities of the Geological Survey in classifying the public domain and in topographic mapping, with the result that the development and conservation of our natural resources should be arrested and millions of dollars of property and many lives lost because of failure to provide adequate appropriations for the completion of the topographical mapping of the country. Certainly this could not be construed as a saving of money in the public interest.

"The Director of the Budget should arrange his financial statement in such a way as to permit a correct appraisal of the reductions made on the basis of national economy by indicating precisely how much of the total reduction in expenditures should be allocated to—

1. Interest on the public debt and payments thereon.
2. Cost of operating the government establishment.
3. Maintenance and repair of government property.
4. Capital investment in government projects.

"The present practice of the Budget in setting up an arbitrary figure beyond which the total expenditures of the government shall not go is neither correct nor economically sound, because it permits no accurate appraisal of government needs and what has been accomplished in relation to those needs, and because, if adhered to rigidly, it would result—as it has—in serious wastes of public income and the curtailment of the government's economic development.

"The present Budget organization should be materially enlarged to include in its personnel technical advisers who are thoroughly equipped to pass intelligently upon the needs of every governmental activity and to correctly estimate its importance in relation to the entire scheme of national and governmental economic development."

Moscow Silver Resumes Shipments to Smelter

Shipments of ore to Salt Lake smelters have been resumed at the Moscow Silver Mines property, in the Star district, near Milford, Beaver County, Utah. Production is coming from the winze sunk to the 1,565 level and from workings on that level, where the company is prospecting. Sinking of the main Cullen shaft to the 1,600 level will be undertaken this spring.

Anaconda's Montana Payroll Now $40,000,000 a Year

ON APRIL 1, Anaconda Copper advanced the wages of all mine, mill, and smelter employees 25c. a day, in keeping with similar wage increases at copper mines throughout the country. This was the fourth increase in seven months, and makes the basic wage at Butte $6 a day. Anaconda now has a payroll throughout Montana of more than $40,000,000 a year. In Butte alone, the mining companies have a payroll of about $3,000,000 a month. During several days in March, Anaconda reached a peak production of 1,000,000 lb. of copper a day.

Wages have also been increased in Utah and Nevada. The increase in Arizona was announced in last week's issue. In the Anaconda announcement, no mention was made of the retroactive clause, the statement merely being: "Effective April 1, 1929, and until further notice, the wages of all employees upon the daily payroll will be advanced 25c. a day over present scale." Heretofore the wage increases had been accompanied by a statement that they were to be maintained until copper prices fell below a certain level.

Three Killed by Falling Rock at Levack Mine

THREE miners employed at the Levack mine of International Nickel, Sudbury, northern Ontario, were buried alive under falling rock and sand April 4. The men went on shift at 7 in the morning to work on the ore pillar between the fifth and seventh levels. A hanging block of muck gave way under them and they dropped a distance of 20 ft. from the chute opening on the 7th level. About 100 tons of fine sand and pulverized rock fell on top of them. A fourth man of the party saved his life by clutching a hanging rope as he fell. An inquest will be held.

The growing demand for nickel is reflected in plans of International Nickel for increasing production from the Levack mine. Up to the present, operations at the Levack have been confined to territory above the 600 level. Production will be increased by deepening the shaft to approximately 840 ft. and opening up two new levels. A new and larger hoist is being installed in the inclined shaft which serves the Levack.

Shurtleff and Lockes Given Jail Sentences

THREE of the five defendants convicted in the Canario Copper trial were sentenced to jail on April 8 by Judge John C. Knox, and the other two received suspended sentences. George Shurtleff, president of Cameron, Michel & Company, was sentenced to four years in the Atlanta penitentiary, and his two brothers-in-law, Herbert and John Locke, were sentenced to three years each. All three men will be put on probation for five years when their prison terms end.

Harry C. Carragher, associated with the Lockes, received a suspended sentence of five years and John Carter Anderson, the Canario Copper engineer, received a suspended sentence of two years. All of the defendants except Anderson had been convicted on charges of conspiracy and fraud. He was found guilty on the conspiracy charge only.

Gypsum Producers Meet to Define Unfair Practice

A majority of the important factors in the gypsum industry was represented at a trade practice conference held in New York on March 28 under Federal Trade Commission auspices. According to Commissioner William E. Humphrey, who presided, the meeting was a notable success. A number of rules to define unfair practices according to the needs of the gypsum producers were unanimously passed. These rules are now before the commission for final acceptance.

Glacier Silver-Lead Applies for Power License

Glacier Silver-Lead Mining has applied to the Federal Power Commission at Washington for a license covering its constructed project in Granite Creek, Lincoln County, Mont., which affects lands in the Kootenay National Forest. The project consists of a timber-crib diversion dam, 5 ft. high and 70 ft. long; a wood-stave conduit, 8,430 ft. long; a power house with an installed capacity of 350 hp.; and 550 ft. of transmission line. The developed power is used in the company's mining operations.

Engels Shaft at 14 Level

At the Engels mine of California Copper, in Plumas County, Calif., the shaft has been sunk to the 14 level, and a station is being cut at that point. The orebody has been opened up for a length of 240 ft. on the 13 level. Diamond drilling has been started in the north area of the 13 level, but no ore has been found thus far.

Mining Equipment Ordered for Mine at Elk Lake, Ont.

The Paramount Syndicate, operating in the Elk Lake district, northern Ontario, has placed an order for a mining plant including a compressor, hoist, boiler, two drills, and other equipment capable of sinking to 300 ft. The shaft is now down 45 ft. Two veins have been struck in the shaft about 3 ft. apart. High-grade silver ore is being bagged for shipment.

New Hoist in Operation at Constitution Shaft

OPERATION of the new electric hoist at the main operating shaft of Constitution Mining & Milling, in the Coeur d'Alene district, was started in the last week in March. The hoist was built by the Coeur d'Alene Hardware & Foundry Company, of Wallace, Idaho. Its double drums are 36 in. in diameter, with a capacity for 2,750 ft. of rope. The hoist is designed to meet requirements to a depth of 1,500 ft. and lifts 6,000 lb., or three tons, at a speed of 550 f.p.m. Power is furnished by a 100-hp. General Electric motor.

Two large underground chambers were cut near the collar of the shaft, in the main operating tunnel level, to accommodate the hoist. The deepest level at the property is now only 400 ft. below the main tunnel, but sinking will be started to the 600 level immediately. New drifts will also be driven on the 400 level.

Sunshine Increasing Capacity With New Ball Mill

Installation of a new ball mill at the Sunshine Mining concentrator, in the Coeur d'Alene district of Idaho, will increase the capacity of the plant from 125 to 200 tons a day. The ball mill is being built by the Union Iron Works, of Spokane, and will be in operation in about six weeks. Sinking of the winze from the 500 level to the 1,300 level of the mine is being resumed. The winze had been temporarily bottomed at the 900 level while development of the vein at that depth was undertaken.

European Engineers to Stop Here on Way to Tokio

Arrangements for the reception of 100 of Europe's most distinguished engineers and scientists, who will arrive in New York during the summer en route to the World Engineering Congress at Tokio, have been placed in charge of Roy V. Wright, president of the United Engineering Societies, as chairman of the New York reception committee, according to an announcement from Maurice Holland, executive secretary of the American Committee of the Congress, of which Dr. Elmer A. Sperry is chairman. Mr. Wright will be aided by a committee of New York engineers.

North Butte Hoisting Ore

According to Paul A. Gow, president and general manager of North Butte Mining, the company is now working its Granite Mountain property at Butte from the 600 to the 2,800 levels, and is hoisting ore. Its Main Range shaft, in the eastern part of Butte, has been unwatered below the 1,600 ft. point.

Planet Mill Put Into Operation at Merritt, B. C.

ON MARCH 24, operations were started at the new 100-ton flotation plant of Planet Mining & Development, at Merritt, B. C. This company owns a large consolidation of claims, including the Planet and Donohue mines, and has started driving a tunnel to develop the entire group at greater depths. In the meantime, the mill will be supplied with ore mined by shaft from the Planet vein, which averages 3½ ft. in thickness, and which contains gold, silver, lead, and zinc. Sufficient ore has been developed to keep the mill running for the present year. At the end of this period, development now under way is expected to augment the reserve.

According to Peter L. Bancroft, president of the company, more than $250,000 has been spent on developing and equipping the property. He estimates mining and milling costs at between $8 and $9 a ton and expects that the mill should turn out concentrate worth about $3,000 daily. The concentrate will be sent by trucks to Nicola, the nearest railroad station, and shipped from there to the Trail smelter of Consolidated Mining & Smelting.

Starting of mill operations was made the occasion for general festivity at the mine. Directors, shareholders and their friends assembled at Merritt and were entertained by the company at breakfast, after which they were taken to the mine, where the properties were inspected and a barbecue was held.

B. C. Department of Mines Given More Power

THE amendments to existing laws and the new laws passed by the British Columbia Legislature in the session just ended have resulted in generally improving the conditions under which the B. C. Department of Mines works, and are expected to save unnecessary delays and give greater elasticity to existing acts. In all, ten acts were passed that either directly or indirectly affect the mining industry. Among these the following may be cited as being of most interest and importance to metal mines:

The act on mineral survey and development endows the Minister of Mines with increased power in the interest of investors. It provides that in cases in which it appears to the minister that mining shares are being advertised upon statements not in accord with actual facts, as shown by the report of the resident engineers or by any official of the Department of Mines, or if any statements of the above-mentioned nature are being published with the intention of influencing the sale of such shares, the minister may give out any statement that he may consider necessary to prevent injury or loss to investors.

If a corporation other than a private company, as defined in the Companies' Act, issues any publication relating to any mining property in British Columbia, it must file a copy with the resident engineer of the district in which the property is located and three copies in the office of the Department of Mines at Victoria.

This act also provides that the Lieutenant-Governor may constitute any portion of the province a mineral survey district and may establish within or without the district a resident engineer's office for the district.

Any person giving a working bond or lease shall insert therein a clause that during the tenor of the bond all wage-earners shall be paid semi-monthly, and that any person taking such a working bond or lease shall furnish the nearest gold commissioner, recorder, or government agent with adequate security for the payment to employees of the semi-monthly wages.

The Minister of Mines is given the power to enter into an agreement with any company or individual whereby the government shall give a bounty, for a period not to exceed five years, of $3 a ton on pig iron made in British Columbia from British Columbia ore, $1.50 a ton on pig iron made in British Columbia from foreign ore, and $1 a ton on steel shapes made from scrap metal by rolling mills having a capacity of not less than 20,000 tons annually.

In regard to power, the act to amend the Water Act gives the water board of the Department of Lands power to adjudicate on rates charged for electric energy developed by water power. This is interesting because it has a direct bearing on the litigation between Granby Consolidated and West Kootenay Power & Light. However, the board does not have the right to interfere with existing rates unless they are brought before the board.

Another act extends the legal radius of West Kootenay's operations from a radius of 50 miles to one of 150 miles from the City of Rossland.

Falls 250 Ft. From Tram and Lives

AN UNUSUAL ACCIDENT occurred upon the 9-mile wire rope tramway which connects the Walker mine, Plumas County, Calif., with Spring Garden, on the Western Pacific Railroad. The tram rider, Donald Jeff, experienced a 250-ft. fall from a bucket in which he was "riding the line." A telegraph wire broke the man's fall, and he landed in a deep snowbank. It is believed that he accidentally unloosened the bucket lock and that the bucket turned over so quickly that he was unable to save himself. Jeff was found about 3 miles from the mine by fellow workers. His right shoulder was crushed and his right arm broken in several places. He was brought to San Francisco for hospital treatment.

Arizona Metals to Build 600-Ton Leaching Plant

PLANS for the construction of a 600-ton leaching plant at the Zonia property, near Kirkland, Ariz., are now being prepared by Arizona Metals, Inc. The plant will be constructed under the supervision of E. L. Sweeney, who has been conducting the experimental work. W. J. Loring is general manager of the property, which has been under development for the last two years. The orebody is said to have been proved for a distance of 6,000 ft. Development work has been done on a length of about 1,800 ft., and to a depth of 300 ft. The ore averages 1.84 per cent copper and will be mined by the glory-hole method. Arizona Metals also owns the Golden Daisy Mines Consolidated, which controls several inactive properties near the Zonia.

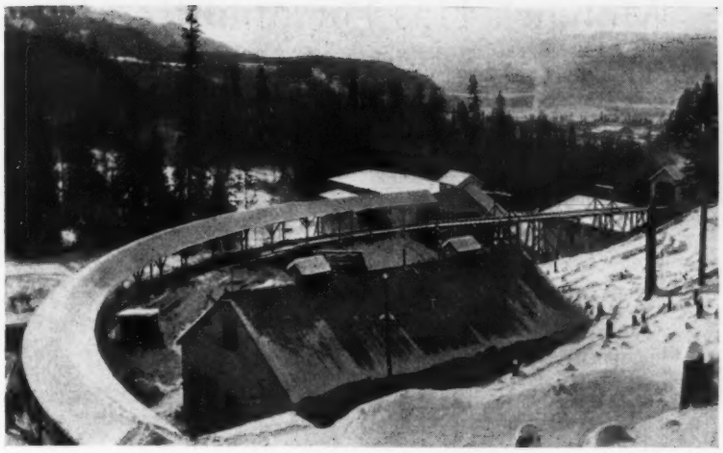
According to the present plans, the ore, after being crushed to ⅜-in. size, will be carried by a conveyor belt to two Dorr classifiers, which will be mounted on tracks above the coarse sand leaching tanks. The coarse material—on 65 mesh and up to ⅜-in. size—will be dumped into the leaching tanks and the overflow will be sent to agitator tanks. The acid solution will be introduced before classification. Copper from the fine material will be dissolved during the process of classification and settlement.

In the agitation tanks, after the settling has taken place, the slime will be decanted off. The coarse sand, fine sand, and slime are washed separately. Coarse sand takes three days for leaching and one day for washing. The fine sand will be leached in transit, and washed for one day. The slime will also be leached in transit, but will require two days for washing. In experimental work it was found that the ore, when leached without being classified, took longer to treat than any one of the classified products. Precipitation will be accomplished by the use of scrap iron. In conveying the acid solutions, rubber hose will be used instead of lead pipe. An extraction of 93 per cent of the copper content is expected.

Changes Made in Board of Basin Cataract

AT a recent meeting of the board of Basin Cataract Mining, a rehabilitation of Jib Consolidated Mining, A. H. Breed resigned as a director and Charles Anderson was elected in his place. Mr. Anderson also was elected president, succeeding A. S. Lavenson, who is now first vice-president. Lemuel D. Sanderson was re-elected second vice-president and Robert S. Lamborn, secretary-treasurer.

Henry W. Turner, manager of the company, recently made an inspection of the workings at Basin. The drifts on the 200 level of the East Katie have been extended 100 ft. to the west and 75 ft. to the east, with ore showing in several places.



Surface plant of Grandview Mines as seen from the mountain side just above the portal of the main tunnel. The town of Metaline Falls is visible in the background.

Grandview Mines Operating New Concentrator at Metaline Falls

AMONG the recent developments in the Pend Oreille district of Washington has been the starting up of the first unit of the new lead-zinc concentrator erected by Grandview Mines near Metaline Falls. The new plant has a capacity of 350 tons, but later it is planned to treat 2,400 tons daily at the property.

Underground operations are also being carried on steadily. The glory-hole method of mining is employed where the orebodies outcrop. Raises are extended from a haulage tunnel below and are provided with grizzlies, bull-dozing chambers, and air-operated chute gates. In sections of the mine, however, where there is excessive overburden, the ore is extracted by shrinkage stoping methods. The adit tunnel is 8x9 ft. in cross-section and is equipped with a trolley electric haulage system. A train of eight cars, containing a total of 56 tons, is hauled a distance of 2,000 ft. to the crushing plant, which adjoins the mill, 500 ft. from the portal. The mine is equipped with the latest machinery, and every precaution has been taken to keep costs at a minimum.

Ore from the mine is discharged into a bin of 300 tons' capacity from which it is fed by an 8-ft. revolving drum feeder to a No. 8 Allis-Chalmers gyratory crusher and reduced from 18 in. to 2½ in. It then passes to a set of 54x20-in. Taylor heavy-duty rolls, in which it is reduced to minus 1 in. and then conveyed to the mill feed bin of 350 tons' capacity. Buildings housing both the crushing plant and mill are of steel construction and are provided with overhead traveling cranes. The mill feed bin is served by two Stephens-Adamson roll feeders, which may be operated simultaneously or separately, as required. The ore weight is recorded automatically by a weightometer while it is conveyed to an 8x6-ft. Marcy ball mill. Grates are closed, and the trunnion discharge is provided with a return feed screw to prevent escape of coarse material. A 6x22-ft. Dorr classifier is in closed circuit with the ball mill, the classifier overflow, 30 per cent solids and minus-100 mesh, going to M. S. Sub. A type flotation machines.

No thickening of the froth is required before filtering. Froth is delivered by gravity to 6-in. bucket elevators which discharge into American disk filters installed directly over the concentrate bins. These are elevated so that trucks can be driven under them for loading. The concentrate is then hauled a distance of a mile to the railroad at Metaline Falls for shipment. A recovery of 88 and 94 per cent with a grade of concentrate of 72 and 60 per cent, respectively, for lead and zinc is obtained.

Operations at Grandview Mines are in charge of R. W. Lloyd, general superintendent. W. L. Zeigler acts as consulting metallurgical engineer to the company. Equipment for the new concentrator was supplied by the Eastern Iron & Metal Company, of Salt Lake City.

Electric haulage equipment at Grandview Mines. The ore train shown is about to be dumped into the crushing-plant ore storage bins.

Ohio Copper May Re-treat Tailing Dump at Lark

TESTS of material from the tailing dump of Ohio Copper, at Lark, in the Bingham district of Utah, indicate that 4,995,459 tons on the dump, carrying .475 per cent copper, or 47,405,671 lb., can be re-treated at a profit, in view of the present high prices of copper. The tests were conducted by General Engineering, of Salt Lake City.

In addition to its leaching-in-place operations, the company may undertake mining of a developed tonnage of copper ore, as well as an undeveloped portion known as the East orebody. Exploration of the limestone horizons for silver-lead orebodies, indicated by diamond drilling, is being continued.

Thirty-three Hydraulic Operations in California

ACCORDING to the 1928 report of the California Débris Commission, 33 hydraulic mines are now operating under permits in California. During the year 78 inspections of débris dams were made and seven new applications for permits were received and approved.

A crew of men has been put to work on the Bergen placer property, on Trinity River, near Junction City, Calif. The new La Grange Company is hydraulicking on West Beaver Creek, Trinity County, and has 30 men at work. Milo Senger is superintendent. Preparations for work are being made by Fortuna Mining on Dutton Creek, the McNamara on Coffee Creek, and the Seymons placer property near Carrville. Madrona Gold Dredging has completed dredge construction. The company controls a 400-acre dredging area above Junction City, Trinity County.

To Reopen Down Town Mines, in Leadville District

JESSE F. McDONALD, of Leadville, Colo., president of the Colorado Mining Association, and formerly Governor of Colorado, states that the Down Town Mines properties, in Leadville, will be reopened this summer. St. Louis and Chicago interests are arranging the financing of the transaction. The property was closed in 1923, when the price of silver dropped. For a time this company was the largest producer in the Leadville district. Production to date is estimated at $15,000,000 in gold, silver, lead, copper, zinc, manganese, and iron.

Mr. McDonald was manager of the property at the time it closed down. Reserves were then estimated at about 200,000 tons. Ore shipped from the property averaged about $10 a ton. Total development work on the property, which consist of 75 patented claims, 400 acres in extent, comprised more than 158,400 ft. of underground workings.

Suit Filed Against Colorado Mining Man

JAMES E. PYLE, who is alleged to have represented himself as an "expert mining engineer," with three college degrees, was recently charged with obtaining $400 on false pretenses, in a suit filed against him by A. J. Reynolds, deputy district attorney, in Denver, Colo. Pyle had been employed by the Silver Queen Mining Company, operating in Hinsdale County, Colo. Dr. Francis A. Thomson, head of the Montana School of Mines, has made the following announcement in this connection:

"It is understood that a man by the names of James E. Pyle has been representing himself in Colorado and elsewhere as a graduate of the Montana School of Mines. As a matter of protection to the public and to the profession, the Montana School of Mines desires to advise the public that no one by the names of James E. Pyle has received a degree from this institution, nor has he, according to our records, ever been in attendance as a student."

H. P. Whitney Buys Black Bear

Litigation over the Black Bear mine, in the Telluride district of Colorado, was settled on April 2. Harry Payne Whitney, New York financier, has acquired control of the property. Henry McAllister, Denver lawyer, represented Mr. Whitney, who is interested in several other mines, including the Flin Flon property, in northern Manitoba, now operated by Hudson Bay Mining & Smelting. Mr. McAllister said that he did not know what plans Mr. Whitney had made in connection with the Black Bear.

Mohawk Has Potential Reserve in Michigan Mine

ALTHOUGH engineers' estimates give a life of six, and possibly seven, years for the Mohawk mine proper, in the Michigan copper district, the productive life of the company promises to outlast abandonment of the last of the Mohawk shafts. Long before No. 6 shaft is exhausted, development of the Michigan mine should have reached a stage permitting production of a large tonnage. The showing of copper in "E" shaft at the Michigan justifies the hope that ore will continue with depth, and a considerable tonnage is already available in the upper levels.

No. 5 Mohawk shaft, now furnishing about 10 per cent of present tonnage, will probably be mined out this year, but No. 1 shaft is good for several years. No. 1 is providing about 20 per cent of the rock stamped. No. 6, producing 70 per cent, is the mainstay of the mine. Its richness was responsible for an average yield for the entire mine of 32.3 lb. of copper per ton stamped in 1928, the highest in the history of the property. Later, when Mohawk proper is reduced to one shaft, No. 6's richness may make it possible to continue profitable operations with a smaller total output. Production then should be only a few million pounds less per year than at present.

Only 2.9 per cent of the rock hoisted by Mohawk last year was waste. Little or no selection is necessary in Nos. 6 and 5 shafts.

At the time of the closing down of the Michigan mine in October, 1920, it was producing from one shaft, known as "E" shaft, which was sunk in the Butler lode to a depth of only 879 ft. Production from the Butler vein was curtailed materially by a lack of sufficient openings, but the tonnage of mass and copper rock produced from the shaft in the eight levels was 152,609 and the refined product, 4,044,642 lb., or a yield of 26.5 lb. per ton stamped. The total development was about 18,000 ft. of drifts, crosscuts, and raises.

Sinking "E" shaft about 1,200 ft. more has been recommended. At that depth, approximately 2,000 ft. of exploration of the Butler lode by long drifts both east and west along the lode, with an occasional crosscut at right angles to intersect the hanging wall, can be undertaken. Should developments at this depth fail of expectations, opportunity would be offered to drive an exploratory crosscut.

Should the Butler at depth show mineralization in sufficient quantity to warrant mining, the company would be in a good position to drift upper levels immediately and provide for a steadily increasing production without further loss of time caused by sinking. Prior to suspension, the estimated tonnage in "E" shaft in the eight levels was 2,150,000, containing 53,000,000 lb. of copper, an average of 25 lb. per ton. Equipment at "E" shaft is intact.

The Michigan mine was purchased by Mohawk in 1923. It has prospects on the Evergreen and Ogima lodes as well as the Butler.

Syndicate Buys Gold Hill, Near Round Mountain

STOCKHOLDERS of Gold Hill Mining have ratified an option to J. K. Kitto, as trustee of the Gold Hill Syndicate, of Philadelphia, to purchase all the company's assets. The syndicate is composed of Philadelphia and New York men who are among the principal stockholders of Tonopah Mining and Tonopah Belmont Development. Negotiations were conducted by Clyde A. Heller, president of Tonopah Belmont, on behalf of the purchasing syndicate, and E. H. McMurray, president of Gold Hill Mining.

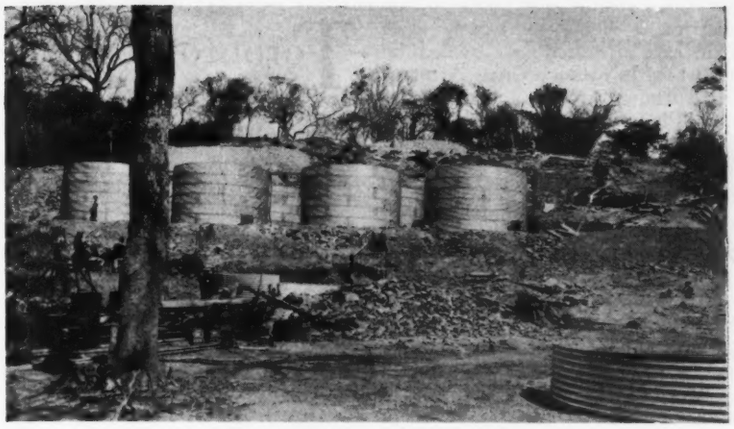
The property of Gold Hill—fourteen claims and a small ranch with water supply—is situated 4 miles north of Round Mountain and 62 miles north of Tonopah, in Nye County, Nev. The ore, which carries gold and silver, is a compact banded quartz in a series of eight or more parallel fissures in rhyolite and on the rhyolite-andesite contact. Development of the main vein to a depth of 300 ft. has shown uniformly good stoping widths of pay ore. J. A. Burgess, in his report, estimates mill heads at $14.10 after dilution of $1.50 per ton, with total costs $7 per ton. Cyanide tests by Albert Silver indicate a high gold recovery.

The proposal of the Philadelphia syndicate involves incorporation in Delaware of Gold Hill Development, with $2,000,000 capital, a share-for-share exchange of the new stock for 720,000 outstanding shares of the old company, payment of $100,000 into the treasury about May 1, and construction of a cyanide mill and continued development of the mine.

Osceola Shafts of C. & H. Producing 3,200 Tons Daily

An average of 3,200 tons of copper ore is being sent to the mill daily from the Osceola amygdaloid shafts of Calumet & Hecla Consolidated, near Calumet, Mich. This is the largest output from this department since it was reopened. Production probably will remain at about this figure, unless more miners become available.

Osceola yield is estimated at about 21 lb. of refined copper per ton. The bulk of the Osceola ore is stamped in the Ahmeek mill and the remainder in the Calumet mill. The Ahmeek mill now is operating seven days a week instead of six, as heretofore.



Cyanide tanks at Luiri mill

Luiri Developing a Promising Gold Mine in the Rhodesian Copper District

By George L. Walker
Special London Correspondent

DISCOVERY of a series, or group, of gold occurrences, as one result of prospecting vast areas for copper in Northern Rhodesia, was announced a little over a year ago. Though gold has been mined in Katanga and farther north in the Belgian Congo, in Southern Rhodesia, and in the Transvaal, no gold worth mentioning had previously been found in Northern Rhodesia. For these reasons the discoveries then excited mild interest, which has been heightened by the result of about 3,500 ft. of development work done since then. The type of the deposits has proved to be entirely different from those on the other side of the Zambezi, in Southern Rhodesia, the mineralization being pronounced and very persistent.

In March, 1928, Luiri Gold Areas, Ltd., was formed to take over three properties, about 184 square miles in area, from Rhodesia Minerals Concession. Luiri's capital was only £60,000 (120,000 each of preferred and ordinary shares of 5s. par), yet this paid for the properties, satisfied an interest held in them by Loangwa Concessions, and provided about £23,000 in cash.

Under the direction of P. K. Horner, consulting engineer, this small fund was made to develop a mine at Luiri's Matala Hill property, 70 miles west from the railway, erect a 50-ton mill, and start production, all in a period of about nine months. A part of the mill was run in January and 150 oz. of gold produced.

The favorable character of developments has caused Luiri Gold to arrange for an extension of its prospecting and location rights to the end of 1934, and also to provide £60,000 of new working capital, through an offer of 240,000 additional ordinary shares at par. Each share will carry an option to purchase an additional share at 7s. 6d.

Area "B," containing Matala Hill, is 70 square miles in extent; Area "A," 35 square miles, is 40 miles east, and Area "C," 72 square miles, is 15 miles west of Area "B." The distinguishing geological feature at Matala Hill is a hard blue-gray formation that occupies a zone of shearing. This is believed by H. E. LaTendresse, who reported on the geology of the area, to be a tourmaline-quartz vein. Though metamorphism has almost entirely obliterated the original character of the rocks, he believes the whole formation to be made up of sedimentaries.

The principal orebodies at Matala Hill are found along the footwall of the vein in the shear zone, which seems to have a strike of 3 miles and a dip of about 70 deg. to the south.

Dr. C. Gilbert Cullis examined specimens of the ore in London, and thought them to be "quartz-sericite schists, derived by metamorphism from an igneous rock of acid composition," of quartz and feldspar, probably "a pegmatite or an aplite." He concluded that the ore would change to sulphide at depth, and went so far as to suggest that it might "become a gold-copper proposition of no little importance."

P. K. Horner in a native dugout

Six or seven oreshoots have been disclosed by driving, mostly on the 100 level. Sampled over widths of 4 ft. in all cases, these shoots average for the lengths given: 160 ft., 12.2 dwt.; 75 ft., 12.7 dwt.; 170 ft., 32.7 dwt.; 200 ft., 9.2 dwt.; 90 ft., 8.3 dwt.; and 50 ft., 28.7 dwt. The last 50 ft., is in an oreshoot which appears to be 300 ft. long, four trenches across its outcrop averaging 14.2 dwt. over a width of 4 ft. This drive, at last account, was being continued. Little work has been done on the 200 level, but a crosscut driven at that depth found at 83 ft. from the shaft 25 dwt. of gold per ton over 26 in.; at 97 ft., 78.8 dwt. (width not stated), and at 104 ft., 101.4 dwt. over 20 in.

At what is called the Dunrobin, in Area "B," a limited amount of work also revealed excellent ore. The reef there was followed down by a winze from 33 ft. to 125 ft. of depth. Sampled every 3 ft. it averages 31.9 dwt. per ton over widths averaging 20.4 in.

Mr. Horner visited the properties last November. His plan is to have the mill put in condition to run continuously at capacity, sufficient oxidized ore (free of copper) being assured for several years' operations; to deepen the Matala Hill shaft to 300 or 400 ft. and extend crosscuts and levels at 100-ft. intervals; to develop the Dunrobin property; and to select at least three of the other most promising prospects for exploration.

After necessary alterations and the installation of a pipe line, Mr. Horner thinks it will be possible for the mill to treat about 1,500 tons of ore per month averaging 12 dwt. (51s. 6d. per ton), with mining and treatment costs under 22s. per ton.

Of areas "A" and "C" very little is yet known, except that they have good surface showings of gold. As Area "A" is crossed by the road constructed from the railway to Matala Hill, its exploration probably will be taken in hand soon.

Two North Tintic Companies to Develop Ground Jointly

TWO North Tintic properties, near Eureka, Utah—the Lehi Tintic and the Tintic Empire—are being developed on a co-operative basis through the Lehi Tintic shaft, under the direction of Charles Zabriskie. The Lehi Tintic is working from the lowest or 950 level, crosscutting the formation for the Gold Blossom vein, and the Tintic Empire is drifting from the 750 level to cut the same vein in its ground.

The North Standard, also in the same area, is sinking on the 1,100 level and the Central Standard is drifting to the southwest toward the North Lily in the quartzite on the 1,200 level.

Mexico City Letter

By W. L. Vail
Special Correspondent

Federal Victory at Jimenez Reopens Railroad to Chihuahua Districts

Mexico City, April 6, 1929.—The defeat of the Mexican rebel forces at Jimenez led to the immediate opening up of railroad communication with the mining districts of Parral, Santa Barbara, and Inde, notably relieving the mining situation in those sections of Chihuahua and Durango. On the occupation of Jimenez by federal forces and pending the taking of Chihuahua City, ore trains were sent to the Monterey smelter via Escalon, Sierra Mojada, and Cuatro Cienegas. Although it is too early to estimate losses at mining camps as a result of the revolution, they probably will be slight. Throughout southern and central Mexico the mining camps have been enabled thus far to secure sufficient supplies and transportation facilities to continue normal operation.

FOR a time the possibility loomed that the A. S. & R. plant in San Luis Potosi and the Barreno mines of the Compañia Metallurgica might have to be closed because of inability to obtain supplies, but this was avoided by prompt action on the part of the government. Closing of these properties would have thrown several thousand men out of employment and might have added to the disaffection in the north. According to statements from the mining chamber in this city, the government has been exceedingly liberal and efficient in facilitating shipments of explosives to responsible mining concerns and in providing fuel in sufficient quantities.

According to the local press, numerous mining properties belonging to rebel chiefs have been confiscated in Chihuahua, Sonora, and Zacatecas. Among those affected are Generals Manzo, Topete, Caraveo, and Guiterrez, all of whom held various producing mines. The properties will be sold at public auction.

In Sonora operations have not been greatly hindered, because the rebels have endeavored to give the operators every facility to continue producing. Attempts to interfere with the operations at the Boleo copper mines, at Santa Rosalia, Lower California, have been frustrated by the prompt action of the loyal forces that adhered to the government in La Paz, capital of the state.

American Smelting & Refining has reopened the Santa Francisca mines, near Asientos, Aguascalientes, and is shipping ore to its San Luis Potosi smelter. A. S. & R. is also operating a narrow-gage railroad connecting the mine with the station of San Gil, on the old Mexican Central Railroad. Output of the San Geronimo copper mines, also in this district, is being increased. The properties are operated and owned by a French firm in Mexico City. At present 250 workmen are employed.

Silver Plume Mining, operated by Los Angeles interests, has discovered a new orebody in the Olive vein, on its properties 26 miles south of Cananea, State of Sonora. The strike has been made near the surface. The ore is said to be 10 ft. wide, in a 20 ft. vein, and contains silver and lead. Construction of a 50-ton flotation plant will start immediately.

Another attempt will be made to work old placer fields on the lower Balsas River, in Guerrero, and other placers in the same district, across the river in Michoacan. Several attempts have been made within the last twenty years, but they have all been unsuccessful.

Final payment has been made on the old San Fernando mine, in the Sierra Juarez district, Oaxaca, recently purchased by Alabama interests, and work has begun on the construction of a power plant and flotation mill. The San Fernando has been idle for more than twenty years. Majestic Mining, at Totolapam, in the same state, is preparing to deepen its main shaft to the No. 7 level.

Construction of the new A. S. & R. lead refinery at Monterey has not been affected by the revolution, according to reports. The work will probably be completed in about six months.

Will Operate Three Mines at Silverton, B. C., Jointly

VICTORIA SYNDICATE, of London, and Galena Farm Mines have acquired the Hazard group, situated between the Galena Farm and Hewitt mines, at Silverton, B. C., and have organized Galena Farm Consolidated Mines to take over and operate the properties. The consolidation consists of 27 crown-granted claims and fractions. Galena Farm and Hewitt are old properties, which were staked in the early 'nineties. Both have good production records. The Hazard has no record of production, but it is situated on the same shear zone as that from which ore on the other two properties has been mined.

Recent development at the Galena Farm has exposed an oreshoot for a length of 1,200 ft. Victoria Syndicate acquired the Hewitt three years ago, remodeled the mill to a 50-ton flotation plant, and last year made an operating profit of $170,000.

The old gravity mill on the Galena Farm property and the remodeled mill at the Hewitt will be dismantled, and such parts as are suitable will be used in the erection of a 150-ton mill on the shore of Slocan Lake, whence concentrates will be shipped by barges and tugs to the Canadian Pacific Railway Company's tracks and thence to Tadanac. The tramway will be dismantled and used in the same way to serve the three properties.

Toronto Letter

By Our Special Correspondent for Northern Ontario

Falconbridge Nickel Shaft Sunk 255 Ft. in Month—Now 627 Ft. Deep

Toronto, April 6, 1929.—Shaft sinking at the Falconbridge Nickel mine, in the eastern part of the Sudbury district, northern Ontario, is being pushed rapidly toward its objective of 1,000 ft. On April 1, the shaft reached a depth of 627 ft. During March it was sunk and timbered 255 ft. The Falconbridge shaft has three compartments and measures 7½x17 ft. outside the timbers. Ernest Craig is in charge of the shaft sinking, which is being conducted on a three-shift basis, with six men to a shift. The sinking crew is also doing its own timbering. This footage compares favorably with the best records attained during the sinking of the Frood shaft of International Nickel or the big No. 11 shaft of McIntyre-Porcupine Mines, Ltd., at which the best advances were 246 ft. and 250 ft. respectively in 31-day periods.

AT THE Sudbury Nickel & Copper holdings in the Sudbury district, which are controlled by the same interests as Falconbridge Nickel, an active exploration campaign is planned for the coming season. This company owns more than 10,000 acres of mining land in the district. Two diamond drills will soon be put into operation on the Strathcona mine, and contracts have also been let for drilling other claims.

The vein on the property of Chibougamou Prospectors, in the Chibougamou district, Quebec, has been struck by diamond drilling at a depth of 242 ft. on an incline of 55 deg. The drill passed out of the vein at 323 ft. The entire core, representing a true width of about 40 ft., has been shipped to Montreal, where it will be analyzed. The mineralization is largely pyrrhotite, carrying some pyrite and chalcopyrite.

Second Air-Mapping Expedition Sent to Alaska

A SECOND air-mapping expedition is being sent to southeastern Alaska to continue the photographic coverage of this region, according to an announcement by the Navy Department. Three Loening amphibian planes will be used, with the U. S. S. "Gannet" as tender. The aërial and photographic unit of 35 men, together with their equipment, will be carried on a barge. Lieutenant Commander A. W. Radford will be in charge of the expedition. R. E. Sargent, a topographic engineer of the U. S. Geological Survey, who is familiar with the country, will represent the departments of the Interior and Agriculture in an advisory capacity.

MARKET AND FINANCIAL NEWS

Isle Royale Had $342,161 Operating Profit in 1928

ISLE ROYALE Copper Company, subsidiary of Calumet & Hecla in the Michigan copper district, had a net operating profit of $342,161 in 1928. The company's production amounted to 10,520,771 lb. of copper at an average cost sold, but not including depreciation or depletion, of 12.63c. per pound. Earnings statement for 1928 is shown to the right.

The company operated a test section of three Denver Sub-A (Fahrenwald) flotation machines at its mill southeast of Houghton during the latter part of 1928. These machines treated the total mill product amenable to flotation, and the results secured indicated that an additional recovery of 0.8 lb. of copper per ton of ore of the grade at present treated could be attained by the use of flotation.

Receipts

Copper sales	$1,939,166	
Interest	25,027	
Miscellaneous	82	
		$1,964,2

Disbursements

Copper on hand Jan. 1, 1928	$288,857	
Production	1,187,913	
Selling, administration, and taxes	144,583	
Miscellaneous	761	1,622,115
Operating profit		$342,161
Depreciation	$96,947	
Depletion	179,335	276,282
Net profit carried to surplus		$65,878

Production results for the past four years are compared in the accompanying table.

The company plans to explore a large area tributary to its recently unwatered No. 2 shaft by sinking and drifting in 1929. The company's No. 2 mill at Hubbell has not operated for the past year but is in shape to treat ore at any time it becomes necessary.

	1925	1926	1927	1928
Tons of ore treated	378,459	447,747	465,100	440,731
Cost of mining, transportation, stamping and taxes per ton of ore	$2.62	$2.39	$2.50	$2.87
Pounds of refined copper produced	9,543,000	11,017,000	11,391,338	10,520,771
Pounds of refined copper per ton of ore treated	25.22	24.61	24.49	23.87

Homestake Earnings Continued to Improve in 1928

HOMESTAKE Mining Company earned $1,473,547 in 1928 after all deductions, which compares with $1,407,542 earned in 1927 and $559,320 in 1926. The company reports ore reserves totaling 15,136,755 tons, of which 616,160 was broken in the stopes on Dec. 31, 1928. A detailed statement of operation in 1928 follows:

Operating Revenue

Bullion proceeds	$6,566,784	
Wolframite ore operation	6,415	
Golden Gate timber operation	2,345	
Wyodak coal operation	22,698	
Interest and rents	131,714	$6,729,958

Operating Expenses

Mining, hoisting and primary crushing	$2,247,779	
Tramming	71,027	
Milling	643,430	
Express on bullion	7,340	
Employees' welfare	152,799	
Taxes	498,949	
Insurance	19,560	
Salaries, office, legal and general expenses	191,842	3,832,728
Income		$2,897,230
Charges against income: Reserved for depreciation and depletion		1,423,683
Net income		$1,473,547

During the year the company milled 1,416,949 tons, with an average recovery of $4.63 per ton, comparing with 1,317,583 tons milled, and an average recovery of $4.87, in 1927.

Dividends for the Year

Paid from net income for year, as above	$1,473,547
Paid from depletion reserve	284,572
Total	$1,758,120

ERUPCION MINING COMPANY, a subsidiary of Ahumada Lead, reports a net loss of $48,371 on its operation in 1928. O. R. Whitaker, president of the company, states that the exploration work undertaken within and around the old stopes was not as productive as was anticipated. This work will be continued, as there are still unproved indications which justify the expense necessary to open up and further prove the ground. The immediate future ore production of the mine will be from the prospect work around the old stopes and from encountering an extension of the 0-30 body. Present probabilities of these sections are limited and will result in a small output. However, the expense of opening up the ground is warranted, and it is hoped that some of these encouraging leads may ultimately bring in more new orebodies and assure a corresponding increase in output. On the basis of a favorable offer from the Mosqueteros company for the acquiring of the control of that company's stock, a geological examination of the Mosqueteros property was made by Ira B. Joralemon, for Erupcion Mining. The final conclusions of this examination were that a good profitable orebody might be opened up at a comparatively small expense. This exploration work will be undertaken as soon as the necessary agreements can be formulated.

Steel Production Reached Peak in March

Steel production continued to increase until about the middle of March, when the usual seasonal peak was reached, with substantially full operation of all open-hearth capacity and about two-thirds engagement of Bessemer, making about 95 per cent altogether, as Bessemer is only about 13 per cent of the total capacity available.

During the last four years decreases to the mid-summer low rate have ranged from 15 to 25 per cent. Present predictions are that there will be no noticeable decrease in April and very little in May, but there is no trustworthy basis for such predictions. It is true that, in bars, sheets, and strips, mills now have actual shipping orders for more than one month's production, but this is nearly all in specifications against first-quarter contracts, price advances having been asked for second quarter. Some contracts have been made, but the real test of prices will not come until consumers have occasion to specify against the higher-priced contracts. Pipe tube, wire, plate, shape, and tin-plate mills are abreast of their obligations and are not running full, except that Chicago district plate mills are booked for six weeks or thereabouts.

Chibougamou Prospectors Increases Capitalization

At a meeting of the shareholders of Chibougamou Prospectors, Ltd., at Quebec on March 19, it was decided to increase the number of shares from 5,000 to 500,000. Of the new issue 250,000 will be distributed among the present shareholders. Allowing 50 new shares for each share held, this will leave 250,000 shares in the treasury, for which offers have been received oversubscribing the balance four or five times. The shares will be put out at $4 each. Results from drilling operations have been reported as being exceptionally good.

Ahumada Reports Net Loss in 1928

AHUMADA Lead Company, operating in Chihuahua, Mexico, reports a net loss of $150,464 in its operations in 1928, compared with a net profit of $200,399 in 1927. The company's productive operations were further reduced in 1928 as is shown by the accompanying table of lead production:

	1928	1927	1926
Lead production, lb.	12,354,809	24,365,705	41,713,405

Apart from the lead ore mined and shipped in 1928, the company mined and stored 200 tons of vanadium-lead ore, containing 45-51 per cent lead and 9.51 per cent V_2O_5. This ore is to be held in storage until some satisfactory arrangement can be made whereby payment for the lead as well as for the vanadium content can be realized. Consolidated income account for the year ended Dec. 31, 1928, follows:

Sales of lead and silver		$942,090
Mining, reduction and transportation	$681,584	
Duties and selling expense	237,674	
Administration expense and income taxes	31,551	
Lead in process and on hand at beginning of year	89,771	1,040,582
Operating loss		$98,491
Depreciation on buildings, plant and equipment		57,073
		$155,564
Income from investments		5,100
Net loss for the year		$150,464

Operations were carried on at the properties without interruption during the year. The direct causes for the operating loss incurred were the low tonnage produced and the low market price of lead which prevailed during the year. Early in the year a modification was made in the company's smelter contract which has resulted in considerable convenience to its operations, and is somewhat more advantageous than the former contract.

Exploration work directed toward opening up shipping ore on the upper levels in the immediate extensions of the main ore channel was disappointing. There are no measurable ore reserves to be reported at this time. However, the outlook for a reasonable tonnage to be mined from between the 7th and 8th level, and from further exploring the main ore channel, is fair, and the mining operations will be concentrated on these sections. Surface indications and geological conditions are favorable for encountering new orebodies in the unexplored ground toward which the prospecting drives are aimed. The outlay for carrying on the work is fully justified, and the expectancy for success is reported as comparable to that of the average underground mining exploration.

E.&M.J. Weighted Index of Non-Ferrous Metal Prices

100 Is Composite for 1922-3-4

1920	130.92
1921	80.80
1922	93.94
1923	103.43
1924	102.63
1925	111.74
1926	107.74
1927	97.54
1928	99.78

	1927	1928	1929
January	100.46	97.54	106.86
February	100.01	96.73	110.37
March	100.84	96.22	122.71
April	98.63	97.14	.....
May	96.41	99.05	.....
June	95.55	100.16	.....
July	95.42	99.69	.....
August	97.25	99.85	.....
September	96.01	100.53	.....
October	95.36	102.34	.....
November	96.22	103.83	.....
December	98.30	104.28	.....

CLIFF MINING COMPANY, of Michigan, subsidiary of Calumet & Hecla, reports the expenditure of $108,543 on mine exploration during 1928. A diamond-drill hole started from a point on the 20th level, 1,500 ft. northwest of No. 4 shaft, encountered an amygdaloid bed carrying sufficient copper to warrant further exploration. During 1929, important projects consisting of diamond drilling, investigating the strong fissures adjacent to what was taken to be the main Cliff fissure, and exploring various lodes from the bottom of the old mine will be undertaken.

Dome Mines Earnings Maintained

DOME MINES, LTD., operating in the Porcupine district of Ontario, reports profit of $1,939,222 before depreciation or depletion, in 1928, compared with $1,960,584 in 1927. Profit-and-loss statement for 1928 follows:

Revenue

Earnings		
Amalgamation bullion	$2,553,262	
Cyanidation bullion	1,361,621	
		$3,914,883
Non-operating revenue		230,350
		$4,145,233

Expenditure

Operating and maintenance		
Mining, including hoisting	$805,963	
Development and exploration	506,007	
Crushing and conveying	79,004	
Milling	474,586	
Administration expenses, general and executive offices	159,815	
Provincial and municipal taxes	60,633	
Insurance	25,106	
		$2,111,117
Reserved for income taxes		94,893
Profit for year		1,939,222
		$4,145,233

Ore reserves at the end of 1928 were estimated at 1,250,000 tons, including 600,000 tons broken in the stopes. A total of 548,000 tons of ore was milled in 1928, compared with 543,000 tons in 1927. Extraction averaged 95.6 per cent as against 96.2 per cent in 1927. The company's exploration department was active throughout the year, but no properties of merit were found.

ST. MARY'S MINERAL LAND, a holding and land-leasing company interested in several of the Michigan copper mines, reports a cash treasury balance of $543,639 on Dec. 31, 1928, compared with a cash balance of $27,613 on Jan. 1, 1928. Dividend distributions totaling $478,080 were paid to stockholders in 1928. C. H. Baxter, of the Michigan College of Mining and Technology, has been retained by the company to supervise its geological and mining affairs and act in an advisory capacity when sales of land or timber are under consideration. On Dec. 31, 1928, the real property of the company consisted of 89,205.63 acres of land, besides mineral rights to 15,422.66 acres.

Current Statistics of Production and Stocks of Copper, Lead, and Zinc

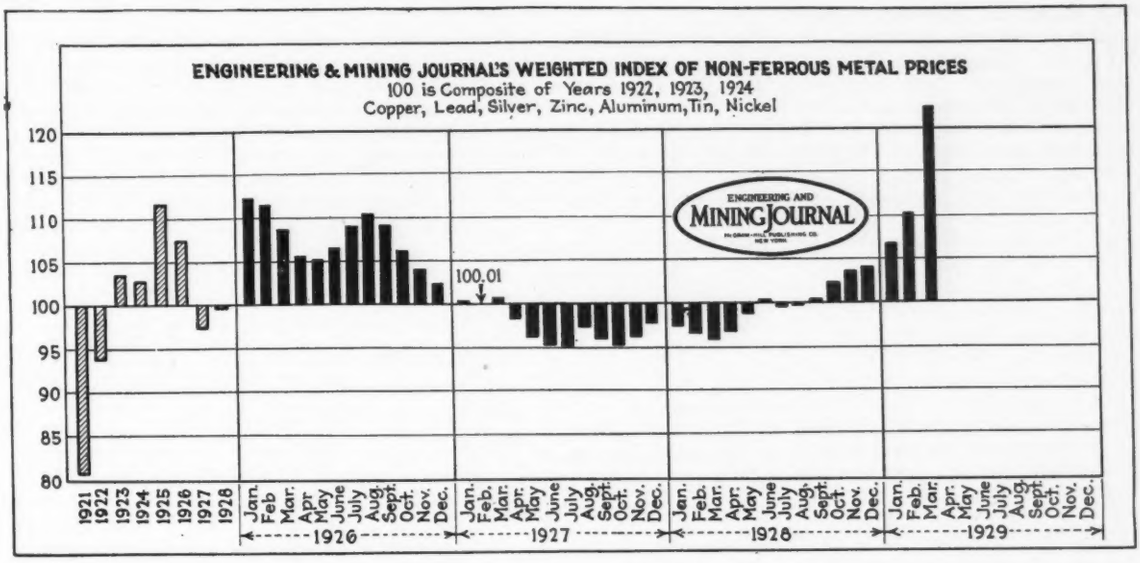
Data from American Bureau of Metal Statistics

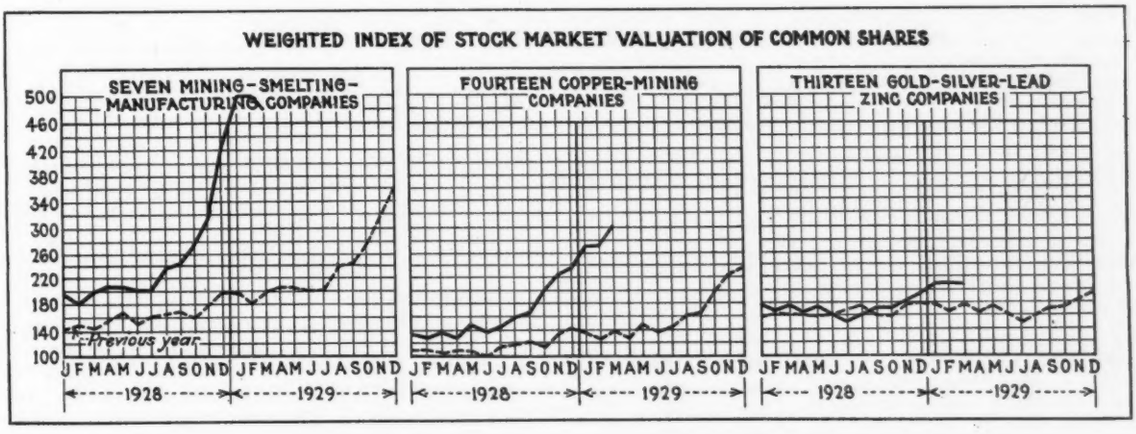
Figures Represent Short Tons

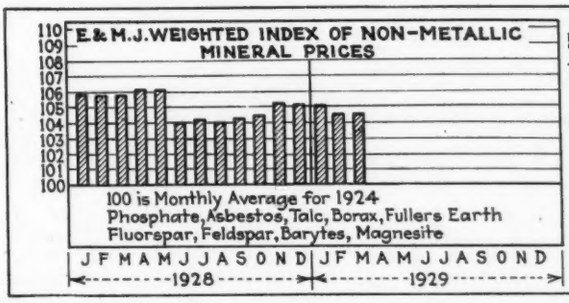
	1927				1928					1929	
COPPER—North and South America	Average	Nov.	Dec.	Jan.	Feb.	Sept.	Oct.	Nov.	Dec.	Average	Jan.	Feb.
Production, refined, daily average	4,045	3,942	4,159	3,959	4,305	4,567	4,813	5,182	4,771	4,448	4,983	5,049
Domestic shipments	68,737	59,264	60,862	64,824	73,789	88,707	100,371	99,822	84,889	81,955	100,135	98,771
Foreign shipments	53,489	52,013	63,637	56,721	60,603	51,292	54,992	49,121	49,703	57,185	57,054	50,150
Stocks, blister and refined	335,311	324,645	327,478	318,137	318,161	290,954	287,380	297,007	315,461	300,771	307,959	295,164
LEAD—United States and Mexico												
Production, smelter, daily average	2,513	2,598	2,517	2,479	2,630	2,503	2,603	2,821	2,700	2,514	2,656	2,550
Production, U. S. mines, daily average	1,798	1,901	1,833	1,755	1,896	1,839	1,875	1,934	1,846	1,785	1,891	1,716
Imports into U. S. A.	13,451	14,282	10,587	10,418	8,574	11,215	15,350	16,935	16,767	12,757	22,924	.....
Stocks, smelter and refinery	156,878	155,568	155,280	157,417	167,692	155,482	152,746	157,485	161,460	160,511	156,182	160,597
ZINC—United States												
Production, daily average	1,681	1,641	1,699	1,691	1,726	1,645	1,621	1,675	1,632	1,693	1,604	1,720
Domestic deliveries	45,811	44,374	46,483	45,771	46,754	44,103	50,126	48,698	49,625	48,301	47,677	51,057
Exports, slab zinc	3,468	2,015	1,042	4,644	2,125	127	884	714	(a)	(a)	(a)	(a)
Exports, ores and dross	4,424	526	2,388	2,444	890	346	90	114	587	453	545	.....
Stocks	37,602	39,320	40,751	42,163	41,290	47,915	46,068	46,542	45,441	44,333	45,418	40,620
World Production Rate (Daily Average)												
Copper	4,543	4,733	4,805	4,631	5,088	5,251	5,698	6,127	5,782	5,236	5,745	5,866
Lead	4,514	4,579	4,456	4,859	5,067	4,950	4,937	5,425	5,265	4,976	5,037	4,983
Zinc	3,910	3,988	4,099	4,179	4,285	4,182	4,223	4,385	4,426	4,271	4,231	4,357

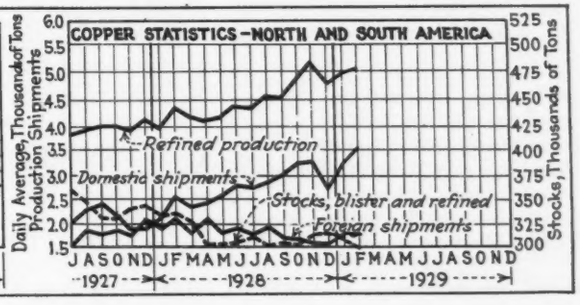
(a) Withheld pending investigation of government reports.

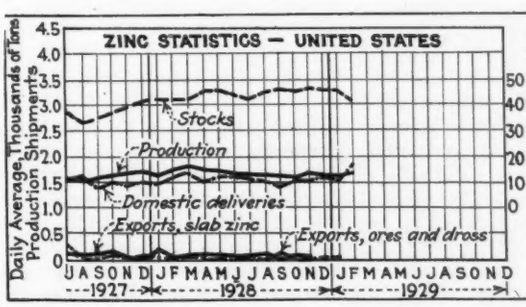
E.&M.J. Statistics of the Mining Industries

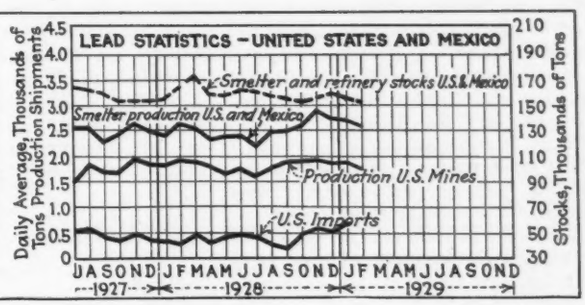





E.& M.J. WEIGHTED INDEX OF NON-METALLIC MINERAL PRICES
100 is Monthly Average for 1924
Phosphate, Asbestos, Talc, Borax, Fullers Earth
Fluorspar, Feldspar, Barytes, Magnesite
1928
1929







London Financial News

By W. A. Doman
Special London Correspondent

London, March 26, 1929—Excitement in the metal market has died down considerably since I last wrote. It would seem that speculation, both in metals and in shares of producing companies, has had its turn for the moment. As regards copper, there seems to be little doubt that consumption is growing and though companies are producing tremendous amounts, the refinery question is arising, and that has kept stocks low, for though there has been talk of hidden stocks of copper, no one, so far as I can ascertain, can say where they are. A similar position exists in regard to lead. In this case the sharp spurt to which I made reference last week was caused to a great extent by a cablegram from New York stating that the metal ought to be bought and, in fact, placing substantial orders for it. The market here assumed the instructions to have emanated to a large extent from speculators, but when a demand was made for delivery, the position appeared in a very different light, and bears naturally were caught. Consumers are not buying ahead, so far as can be gathered, but are simply meeting immediate requirements. The same situation has developed in regard to tin, and the price here is £2 or £3 lower than a week ago. One of the tin magnates suggests that the best thing that can happen to tin is to call a conference of producers, smelters, and consumers, and, by arriving at some arrangement as to requirements, so to regulate output that the price can be stabilized, which it is claimed would be the best for all concerned.

A short time ago I mentioned that the Rhodesian Anglo-American had acquired a large share interest in copper-mining companies in Northern Rhodesia, and, besides buying a large number of Bwana M'Kubwa shares, had the right to call a further large block. Presumably this block has been called, for it is suggested in generally well-informed quarters that negotiations are in progress for the sale to an important American group of 1,500,000 Bwana M'Kubwa shares at a price that gives Rhodesian Anglo-American quite a satisfactory profit. If the rumor be correct, the transaction bears out the suggestion I made some time ago that, to a greater or less extent, dealings in Rhodesian copper shares were of a professional and market character. Steps have been taken, however, to keep the control of the company in British hands.

An interesting position has developed in regard to the Anglo-Chilean Nitrate Corporation and the Lautaro Nitrate Company. The former, according to report, has now made a definite bid of between £6 and £7 per share for the £5 shares of the Lautaro, on condition that 75 per cent of Lautaro shareholders accept. In consideration of the fact that the Lautaro company has only recently acquired a large area at a very low price, the market considers it doubtful whether £6 or £7 will be attractive for the £5 shares. The reason given here for the Guggenheims' desire to purchase Lautaro is that acquisition of the property would enable the American firm to work its own process to the fullest extent and so reap the benefit of the lower costs that would thereby be made possible.

Rumors are current of a possible rise in the price of aluminum, owing to the advance in copper.

New Cornelia Earned $2.78 per Share in 1928 Compared With $1.74 in 1927

NET INCOME of New Cornelia Copper for the year ended Dec. 31, 1928, after deducting $450,933 for depreciation, was $5,008,195, or approximately $2.78 per share on 1,800,000 shares of stock. Corresponding per share income in 1927 was approximately $1.74 on the same number of shares outstanding. Profit-and-loss account for 1928 follows:

Income		
Total earnings on metals	$12,689,648	
Income from dividends	24,408	
Interest	68,922	
Other income	43,319	
		$12,834,897
Expenditures		
Operating expenses	$4,737,973	
Salaries, office and general expenses	102,657	
Freight, refining and marketing	1,392,487	
State and federal taxes	1,142,648	
		$7,375,767
		$5,459,129
Net depreciation		450,933
Less income		$5,008,195

Metal production in the last three years compares as follows:

	1928	1927	1926
Gold, oz.	16,379	18,203	18,114
Silver, oz.	171,943	200,925	234,139
Copper, lb.	77,995,281	72,932,670	82,312,463

Production was gradually increased toward the end of the year.

An extensive drilling campaign, though not concluded, has progressed sufficiently to indicate that the company has two large mines—one from which the ore will be recovered by open-pit mining and the other from which the ore will be extracted by underground operations. The large tonnages of ore thus indicated make increased milling capacity necessary if the most economical results are to be attained.

Statistics of mine production are indicated in the following table, and include both ore and waste.

	Wet Tons	Dry Tons	Per Cent Copper
Total mined	5,484,344	.....	.....
To concentrator	2,604,473	2,571,918	1.345
To leaching plant	1,087,652	1,074,056	1.105
To smelter	56	55	32.590
To low-grade ore dumps	1,792,163	1,769,756	.....
(Sulphide waste)	324,184	320,131	0.393
(Carbonate waste)	1,467,979	1,449,625	0.310

The concentration plant treated an average of 7,070 tons per day; the leaching plant a daily average of 2,935 tons. A No. 7 Symons Cone crusher was installed in the fine-crushing plant, replacing a No. 8 gyratory and horizontal Symons crusher, and was so successful that three additional crushers of this type are to be installed. All 6-ft. classifiers are to be replaced with 8-ft. classifiers as a result of tests recently conducted which indicated that the improvement in classification with the 8-ft. model made the change economically desirable.

The company reports that its Britannia mine, in British Columbia, and El Potosi properties, in Mexico, are in excellent condition for maximum production, the concentrator at Britannia being equipped to treat in excess of 5,000 tons of copper ore and the mill at El Potosi prepared to handle approximately 1,500 tons of silver-lead-zinc ore per day.

The ores of the Calera mine will have been exhausted some time early in 1929 and will be replaced by tonnage developed in the Santo Domingo mine, at El Potosi, so that Calera's cessation will not curtail the Howe Sound's production of lead and zinc ores in Mexico. The company's exploration departments have been active throughout the year, and although no outstanding prospects were discovered, title to some promising claims at Zacatecas, Mexico, as well as options on various properties in Canada, were secured.

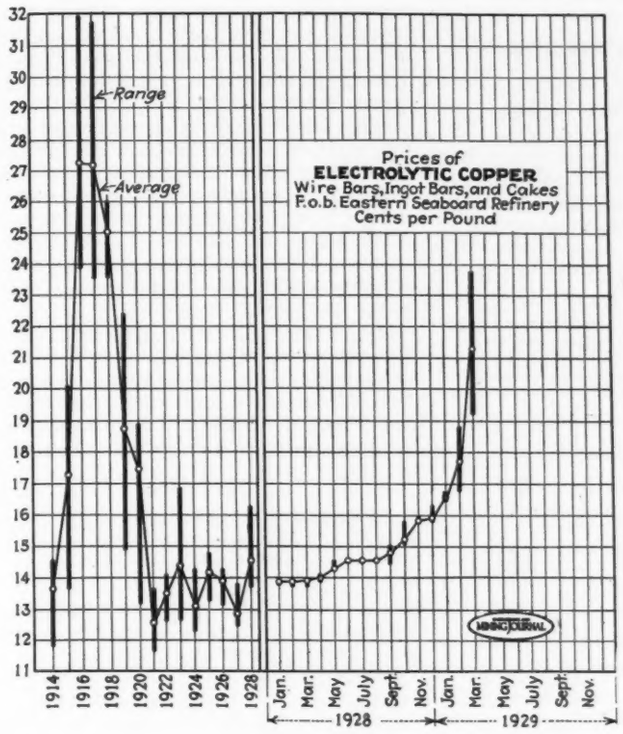
Howe Sound Earnings Higher in 1928

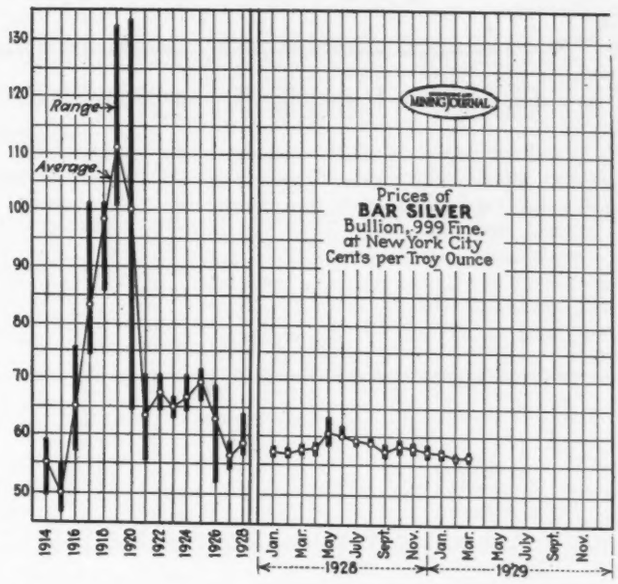
NET PROFIT of the Howe Sound Company, operating the Britannia property, in British Columbia, and the El Potosi and Calera mines, in Mexico, amounted to $2,649,068 in 1928, compared with $2,142,115 in 1927. Howe Sound's metal production in 1928 amounted to 15,366 oz. gold, 3,338,527 oz. silver, 42,201,548 lb. copper, 77,399,285 lb. lead, and 59,378,637 lb. zinc. Income accounts for 1928 and 1927 compare as follows:

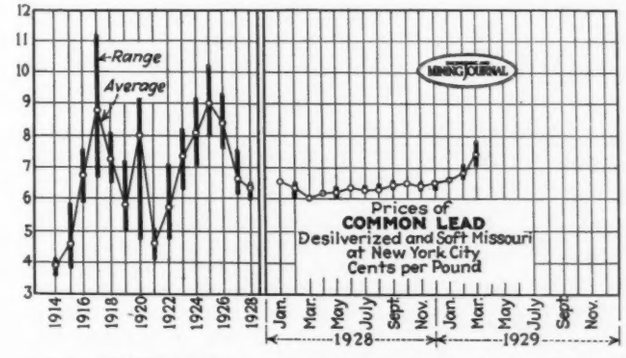
	1928	1927
Total income	$15,720,872	$13,745,527
Expenditures and taxes	12,174,030	10,665,800
Depreciation	897,774	937,612
Net profit	$2,649,068	$2,142,115
Dividends	1,984,152	1,984,152
Surplus	$664,916	$157,963

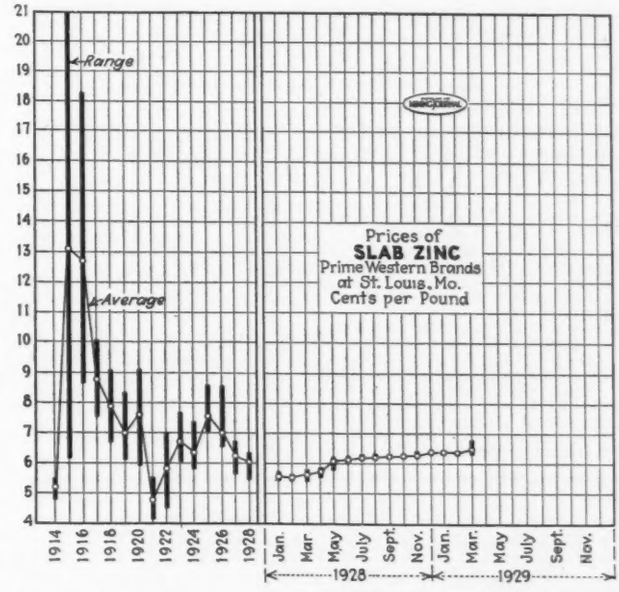
Portland Gold Mining Company, operating in the Cripple Creek district, Colorado, incurred a loss of $191,793, on its operations in 1928, compared with a loss of $199,187 for 1927. However, the company's operations for the month of December showed a net profit in excess of $14,000. This was the first month in two years that operation of the property showed a profit.

Metal Price Curves

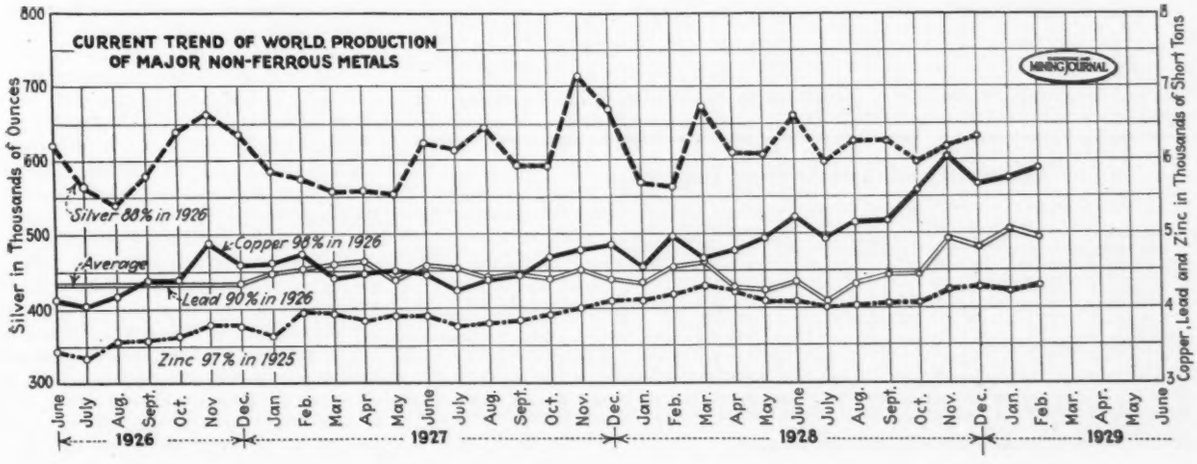

Range
Average
Prices of
ELECTROLYTIC COPPER
Wire Bars, Ingot Bars, and Cakes
F.o.b. Eastern Seaboard Refinery
Cents per Pound
1914 1916 1918 1920 1922 1924 1926 1928
Jan. Mar. May July Sept. Nov. Jan. Mar. May July Sept. Nov.
1928 1929







THE CURVES below are not to be considered as permanent records of production. They show merely the current trend in terms of daily output according to the latest estimates of the American Bureau of Metal Statistics. The figures represent production from countries that produce approximately 98 per cent of the world's copper, 97 per cent of the zinc, 90 per cent of the lead, and 88 per cent of the silver. The figures for lead on the new basis are not available for the individual months of 1926, and accordingly the horizontal line showing the monthly average reduced to a daily rate is shown. Delay in receipt of statistics from Mexico accounts for the failure of the silver curve to be up to date.


CURRENT TREND OF WORLD PRODUCTION
OF MAJOR NON-FERROUS METALS
Silver in Thousands of Ounces
Copper, Lead and Zinc in Thousands of Short Tons
Silver 88% in 1926
Average
Copper 98% in 1926
Lead 90% in 1926
Zinc 97% in 1925
June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar Apr May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June
1926 1927 1928 1929

The Market Report

Copper Leads Metal Price Decline

New York, April 10, 1929.—The nonferrous metals bull market suffered a sharp relapse during the past week. Featured by the decline in copper prices, which amounted to nearly 5c. per pound, the list in general showed a strong downward tendency. Lead prices closed the week 0.6c. per pound below the level of a week ago, zinc prices subsided nearly ¼c. per pound, and tin was off more than 2c. per pound. Speculative declines in London Metal Exchange quotations, and the considerable disturbance of domestic business by the unsettled situation in the securities markets, appear to have been the primary causes of the break in metal prices.

Daily Prices of Metals

April	Electrolytic Copper	Straits Tin	Lead		Zinc
	Refinery	New York	New York	St. Louis	St. Louis
4	23.775	48.125	7.50	7.40	6.80
5	22.90	48.00	7.50	7.35	6.70
6	22.675	47.875	7.50	7.35	6.70
8	21.525	47.50	7.25	7.10	6.70
9	19.975	46.50	7.25	7.10	6.70
10	19.025	46.375	7.15	7.00	6.625
	21.646	47.396	7.358	7.217	6.704

Average prices for calendar week ending April 6, 1929, are: Copper, 23.446; Straits tin, 48.313; N. Y. lead, 7.625; St. Louis lead, 7.508; zinc, 6.767; and silver, 55.938.

The above quotations are our appraisal of the major markets for domestic consumption based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

Copper, lead, and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

In the trade, copper prices usually are quoted on a delivered basis; that is, delivered at consumer's plant. As delivery and interest charges vary with the destination, the figures shown above are net prices at refineries on the Atlantic seaboard. Delivered prices in New England average 0.225c. per pound above those quoted.

Quotations for copper are for the ordinary form of wire bars and ingot bars. For ingots an extra 0.05c. per pound is charged; for slabs, 0.075c.; and for cakes, 0.125c. up, depending on weight. Cathodes are sold at a discount of 0.125c. per pound.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York is now quoted at 0.35c. per pound above St. Louis, this being the freight rate between the two points.

Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

London

April	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic	Spot	3M	Spot	3M	Spot	3M
	Spot	3M							
4	89⅜	89⅝	104	218½	218⅞	25⅞	25⅞	27¼	27 3/16
5	86½	85⅞	104	217½	217¼	24½	24½	26 15/16	26 13/16
8	88	87⅜	104	216½	216½	24 13/16	24 13/16	26⅞	26¾
9	79½	77¾	90	208¾	209	24⅝	24 9/16	26¾	26 9/16
10	77¾	75¾	85	208⅜	209	23⅞	23½	26⅝	26⅝

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

Silver, Gold, and Sterling Exchange

April	Sterling Exchange "Checks"	Silver		Gold London	April	Sterling Exchange "Checks"	Silver		Gold London
		New York	London				New York	London	
4	4.84 11/16	56	25⅞	84s11 d	8	4.84⅞	55⅞	25 13/16	84s11½d
5	4.84¾	55½	25¾	84s11¼d	9	4.84⅞	56	25¼	84s10¾d
6	4.84¾	55¾	25¾	.....	10	4.84⅞	56	25⅞	84s11 d

Average, 55.854

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London silver quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command five-eighths cent premium.

Copper Price Structure Collapses

The necessity for the custom smelters to sell a reasonable proportion of their daily intake of copper was directly responsible for the drastic break in copper prices recorded during the past week. Though this condition is entitled to the direct responsibility, it was the continued absence of demand occasioned by the unsettled credit conditions in Wall Street, and a general feeling that the copper price structure had become top-heavy, that made this situation necessary. Only one sale was made at the producers' 24c. price during the week. Shading of that price by primary sellers began on April 5, and became increasingly prevalent as each day passed. Today the market appears fairly well bottomed at 19½c. per pound delivered Connecticut basis, and a large tonnage has changed hands at that level, of which almost all has been for August delivery.

Business in the export market has been virtually non-existent so far this month. In fact at several times important European interests endeavored to resell at 22½ to 23½c. per pound, copper in this country that they had purchased for delivery in Europe before the general break in prices took place.

Copper Exporters, Inc., maintains its price at 24⅜c. per pound usual European destinations, though offerings of the custom smelters have been made through the association at considerable reductions below that level.

Opinion prevailing last week had been that a period of inactive demand might be expected until the release of the March statistics late this week, which are expected to be decidedly favorable to producers. However, it appears that the position of the custom smelters became so acute with the continued day-by-day accumulation of copper at top prices without anything like equivalent sales that their decision to shade prices was forced by the financial aspect of the situation. A few of the producers are remaining completely out of the market and maintaining a nominal 24c. quotation. Sales during the week have not been confined entirely to the custom smelters, however, and some market factors contend that it would not be surprising to see the Copper Exporters price reduced to the level of the general market in a few days.

Lead Price and Demand Both Drop

The bearish tendency in the copper market had a sympathetic effect on lead, which has declined over half a cent in the last week. On Thursday, April 4, the American Smelting & Refining Company cut its New York price from 7¾ to 7½c.; on Monday, the 8th, a further reduction to 7¼c. was made; and today the quotation was marked down to 7.15c. Other sellers generally quoted equivalent prices, but hardly enough has been sold on some days to establish a price, either in the East or Middle West. It is generally believed that the recent ad-

vance, which emanated from London, was purely of a speculative nature, and that the decline this week was only an aftermath. Certainly no new weak factor is in evidence in the fundamental situation, except that the recent break in the stock market has seriously affected new business of all kinds, the lead industries being no exception. All of the April production of the country probably has already been sold, so there is no pressure on the market. The price reduction is purely a matter of bringing domestic prices in line with London parity.

The Mexican situation is expected to clear up considerably by the end of the month, so that shipments of ore and fuel to the smelters, of bullion to the refineries, and of refined lead for export should show a marked improvement in May. In the meantime, however, mine, smelter, and refinery production and shipments will be seriously affected, with some plants closing down entirely.

Zinc Price Reduced as Demand Slackens

Business in zinc has been extremely quiet during the past week, and a tendency toward lower prices has resulted in a large tonnage changing hands at 6.60c. per pound today, compared with 6.80c. per pound a week ago. There is little change in the statistical position of zinc, and the decline appears to be occasioned largely out of sympathy with the general market decline. Delivery in the third quarter of 1929 has been specified on a considerable proportion of the week's business.

Tin Drops Below 47c.

The London group that has supported the tin market for some time has been content to let prices drop off a little more, in view of the weakness in the other metals, so that prices have been around 46½c. for the last two days. The drop yesterday stimulated a good demand from consumers, much of which was for May shipment. All deliveries are quoted at about the same price.

Silver Closes at 56c.

Unsettled conditions in China depressed silver during the past week, and the decline carried the New York price down to 55½c. on April 5, the lowest level reached since Oct. 6, 1927. During the latter part of the week a resumption of purchases by China resulted in a better undertone, and prices have shown some improvement, the market today being quoted at 56c.

Mexican Dollars (Old Mexican pesos): April 4th, 42¼c.; 5th, 41⅞c.; 6th, 42c.; 8th, 42⅛c.; 9th and 10th, 42¼c.

Foreign Exchange

Closing cable quotations on the principal foreign exchanges on Tuesday, April 9, were: Francs, 3.90¾c.; lire, 5.23¼c.; and marks, 23.71⅛ c. Canadian dollars, ¾ per cent discount.

Other Metals

Quotations cover large wholesale lots unless otherwise specified

ALUMINUM—Per lb., 99 per cent plus grades, price of leading interest, 24.30c. Outside market, 99 per cent plus, 24.30c.; 98-99 per cent, 23.90c.

ANTIMONY—Per lb., duty paid, New York: Chinese brands, 9½c. per lb. for all positions. Cookson's "C" grade, spot, 14¾c.

BISMUTH—Per lb., New York, in ton lots, $1.70. Smaller lots, $1.85 and up.

CADMIUM — Per lb., New York: 85@95c. Active demand.

IRIDIUM—Per oz., $260@$265 for 98 @99 per cent sponge and powder.

NICKEL—Per lb. ingot, 35c.; shot, 36c.; electrolytic, 35c. (99.9 per cent grade) for single lots of spot metal.

PALLADIUM — Per oz., $38@$40. Small lots bring up to $50. Nominal.

PLATINUM—Official price quoted by the leading interest on small miscellaneous orders for refined metal, per oz., $70. Transactions between dealers and refiners in the outside market are commonly reported at several dollars less.

QUICKSILVER — Per 76-lb. flask, $122 cash. Small lots command the usual premiums.

Prices of Chromium, Cobalt, Germanium Oxide, Lithium, Magnesium, Molybdenum, Osmium, Radium, Rhodium, Ruthenium, Selenium, Tantalum, Tellurium, Thallium, Titanium, Tungsten, Vanadium, and Zirconium are unchanged from the issue of April 6.

Metallic Ores

TUNGSTEN ORE—Per unit of WO_3, N. Y.: Wolframite, $14@$15; Western scheelite, $15. Nominal.

Antimony, Chrome, Iron, Manganese, Tantalum, Titanium, Vanadium, and Zircon ores are unchanged from quotations in the April 6 issue.

Zinc Concentrates Unchanged: Lead Prices Lower

Joplin, Mo., April 6, 1929

Blende

	Per Ton
High	$45.85
Premium blende, basis 60 per cent zinc	$44.00@ 45.00
Prime Western, basis 60 per cent zinc	43.00@ 44.00
Table concentrates, 60 per cent zinc	41.00@ 43.00
Flotation concentrates, 60 per cent zinc	38.00@ 41.00
Average settling price, all zinc	43.14

Galena

High	$107.40
Basis 80 per cent lead	100.00
Average settling price, all lead	103.86

Shipments for the week: Blende, 15,237; lead, 1,119 tons. Value, all concentrates the week, $773,540.

Offerings of $105 basis price for lead concentrates during the early part of the week were superseded today by a lower market, with no offerings higher than $100 basis.

The zinc concentrate market remains unchanged in price, but with a lessened demand. Unsold stocks have been lowered to approximately 15,000 tons of the total of 29,000 tons in bins.

Platteville, Wis., April 6, 1929

Zinc Blende	Per Ton
Blende, basis 60 per cent zinc	$46.75

Lead Ore	
Lead, basis 80 per cent	$105.00

Shipments for the week: Blende, 443 tons; lead, 120 tons. Shipments for the year: Blende, 9,103; lead, 560 tons. Shipments for the week to separating plants, 699 tons blende.

Non-Metallic Minerals

Amblygonite, Asbestos, Barytes, Bauxite, Borax, Celestite, Chalk, China Clay, Diatomite, Emery, Feldspar, Fluorspar, Fuller's Earth, Garnet, Gilsonite, Graphite, Greensand, Gypsum, Iron Oxide, Lepidolite, Limestone, Magnesite, Mica, Monazite, Ocher, Phosphate, Potash, Pumice, Pyrites, Quartz Rock Crystal, Silica, Spodumene, Sulphur, Talc, and Tripoli are unchanged from prices in the April 6 issue.

Metallic Compounds

ARSENIOUS OXIDE (White Arsenic) Per lb., 4c. Market firm.

Antimony Oxide, Calcium Molybdate, Sodium Sulphate (Salt Cake), Sodium Nitrate, and Zinc Oxide are unchanged from prices in the April 6 issue.

Alloys

FERROMANGANESE—Per long ton, domestic and foreign, f.o.b. furnace or duty paid, port of entry, $105. Spiegeleisen, 19@21 per cent, $33@$34 f.o.b. furnace.

FERROTUNGSTEN—Per lb. of W contained, 75@80 per cent W, $1.25.

Ferrocerium, Ferrochrome, Ferromolybdenum, Ferrophosphorus, Ferrosilicon, Ferrotitanium, Ferrovanadium, Nickel Silver, and Yellow (Muntz) Metal are unchanged from prices in the April 6 issue.

Rolled Metals

LEAD SHEETS—Price of full-rolled sheets reduced to 11 from 11¼c. per lb.; for clipped sheets reduced to 11¼ from 11½c. per lb., effective April 8.

ZINC SHEETS—Price advanced from 10 to 10¼c. per lb., effective April 4.

Copper, Monel Metal, and Nickel Sheets are unchanged from prices in the April 6 issue.

Refractories

Chrome Brick, Fireclay Brick, Magnesite Brick, Silica Brick and Zirkite are unchanged from quotations in the issue of April 6.

Iron, Steel and Coke

Iron—Per gross ton, Valley furnaces, Bessemer, $18.50; basic, $18; No. 2 foundry, $18.

Steel—Base prices per gross ton, Pittsburgh, billets and slabs, $34; plates, structural shapes, and soft steel bars, per 100 lb., $1.90@$1.95.

Coke—Per gross ton, Connellsville furnace, $2.80@$2.90. Connellsville foundry, $3.75@$4.85. Byproduct coke, Ohio and Kentucky (Connellsville basis) $6.50; Buffalo and Detroit, $8.50@$9.

Mining Stocks—Week Ending April 6, 1929

Stock	Exch.	High	Low	Last		Last Div.
COPPER						
Anaconda	New York	155¾	145½	146½	Mr.29,My.20	Q 1.75
Anaconda, new	New York	130¾	121¼	122¾		
Andes Copper	New York	58¾	52¼	53	Mr.29, My.6	Q 0.75
Arizona Com	Boston	4¼	4	4	Ja. 16, Ja. 31	S.A.0.25
Calumet & Ariz	New York	132	127	128½	Mr.7, Mr.25	Q 1.50
Calumet & Hecla	Boston	53¼	50¾	51¾	Fe. 28, Mr. 30	Q 1.00
Cerro de Pasco	New York	109	104	104	Ap. 11, May 1	Q 1.50
Chile Copper	New York	116¾	107¾	108¾	Mr.22, Ap.22	Q 0.87½
Con. Coppermines	N. Y. Curb	15¾	14¼	15		
Copper Range	Boston	29	27¼	27¾	Mr.15, Ap.15	Q 0.50
East Butte	Boston	5	4½	4¾	Dec., 1919	0.50
Granby Con	New York	98	93¼	95¾	Ap.12, My.1	Q 1.75
Greene Cananea	New York	172¾	163	166¾	Mr. 7, Ap. 1	Q 2.00
Howe Sound	New York	76	72¾	72¾	Mr. 30, Ap. 15	Q1.00
Hudson Bay	N. Y. Curb	19¾	18¼	19¼		
Inspiration	New York	57¾	51	52¼	Mr.14, Ap. 1	Q 1.00
Isle Royale	Boston	31¾	29¾	30	Fe. 28, Mr.30	X 0.50
Kennecott	New York	91¼	85¾	86¾	No. 30, Ja. 2	Q 2.00
Magma Copper	New York	74¾	70¾	71¼	Mr.30, Ap.16	Q 1.25
Mason Valley	N. Y. Curb	1¾	1¼	1¾		
Miami Copper	New York	53¾	45	49¾	My1, My15	Q 1.00
Mohawk	Boston	53¼	51¼	51¾	Ja. 26, Mr. 1	Q 1.50
Mother Lode	New York	5	4¾	4¾	De.14, De.31	SA 0.20
Nevada Con	New York	54¾	50¼	51¾	Mr.15, Mr.30	Q 0.75
New Cornelia	N. Y. Curb	44	41¼	42¾	Fe. 1, Fe. 18	Q 0.50
Noranda	N. Y. Curb	57½	51	52¾		
Ohio Copper	N. Y. Curb	3¼	2¾	2¾	Sept., 1926	0.03
Old Dominion	Boston	15	14¼	14¾	Dec., 1918	1.00
Phelps Dodge	N. Y. Curb	310	300	300	Mr. 15, Ap. 1	2.50
Phelps Dodge, new	N. Y. Curb	79¼	72¾	76		
Quincy	Boston	42	39¼	39¼	March, 1920	1.00
Roan Antelope	N. Y. Curb	48	42¾	47¾		
St. Mary's M. L.	Boston	41¼	39	39	Fe.25, Mr.12	2.00
Seneca Copper	New York	9¾	8	8¼		
Shattuck Denn	N. Y. Curb	22¼	21¼	21¾		
Sherritt-Gordon	Toronto	8.80	8.00	8.70		
Tenn. C. & C.	New York	18¼	17¼	17¾	Fe.28, Mr.15	Q 0.25
United Verde Ex	N. Y. Curb	22	19¼	19¾	Ap. 4, My. 1	Q 1.00
Utah Copper	New York			345	Mr. 15, Mr. 30	Q 3.00
Waite-Ack.-Mont	Toronto	1.90	1.90	1.90		
Walker Mining	Salt Lake	4.20	3.80	4.20		
Wenden Copper	N. Y. Curb	1¾	1¼	1¾		
LEAD, ZINC, SILVER						
Ahumada Lead	New York	3¾	3¼	3¼		
Amer. Z. L. & S.	New York	41¼	35¾	38¾	May, 1917	1.00
A. Z. L. & S., pfd	New York	103	99	100¾	Nov., 1920	1.50
Bingham Mines	Boston	58	53	57¼	Mr.15, Ap.5	0.50
Bunker Hill & S	N. Y. Curb	160	150	150	Fe.28, Mr.5	X 0.75
Butte Cop. & Zn	New York	7¾	7	7		
Butte Cop. Con	Boston Curb	*80	*75	*77		
Butte & Sup	New York	9¼	9	9¼	Mr. 15, Mr. 30	Q 0.50
Callahan Zn-Ld	New York	3¼	3	3	Dec., 1920	0.50
Chief Consol	Salt Lake	3.35	3.27½	3.27½	Fe. 1, 1928	K 0.10
Consol. Ld. & Zn. "A"	St. Louis	13¼	12¼	13	Ap.5, Ap.10	0.25
Constitution	Spokane	*41	*40	*41		
Dayrock	Spokane	2.42	2.25	2.25	Mr.23, Mr.30	0.03
Dickens Consol	Spokane	*10	*6½	*7½		
Eagle-Picher	Cincinnati	19	18¼	19	Mr.31, Ap.15	Q 0.20
Eagle-Pich., pfd	Cincinnati			102	Jan. 15	Q 1.50
Erupcion	Boston Curb	*25	*24	*24	Ja. 1, 1928	Q 0.07½
Eureka Bullion	Salt Lake	*93	*87	*92		
Eureka Lily	Salt Lake			1.42½		
Eureka Standard	Salt Lake	4.85	4.75	4.85		
Evans-Wallower	N. Y. Curb	18¼	17	17¼		
Evans-Wal., pfd	N. Y. Curb			81½	Mr.20, Ap.1	Q 1.75
Federal M. & S.	New York			266	Je., 1927	10.00
Fed. M. & S., pfd	New York	98¾	98¼	98¾	Fe. 21, Mr. 15	Q 1.75
Gladstone	Spokane	*13¼	*12½	*12¾		
Golconda	Spokane	1.17	1.10	1.13	Mr.20, Ap.1	Q 0.02
Grandview	Spokane	*63½	*50	*50		
Hecla Mining	N. Y. Curb	20¼	18¼	18¼	Fe.15, Mr.15	M 0.15
Highland-Surprise	Spokane	*16½	*15½	*16¼		
Jack Waite	Spokane	*13	*11¼	*12½		
Kootenay Florence	Spokane	*12¾	*16	*16		
Lucky Jim	Spokane	*20	*18½	*18½		
Lucky Tiger-C	Kansas City	†5.75	15.50		De.4, De.20	MX 0.12
Mexican Premier	Spokane	1.78	1.65	1.65		
National Lead	New York	157½	154	154	Mr. 15, Mr. 31	Q 1.25
Natl. Lead, pfd. A	New York	140	140	140	Mr. 1, Mr. 15	Q 1.75
Natl. Lead, pfd. B	New York	118	118	118	Ap. 19, My 1	Q 1.50
N. J. Zinc	N. Y. Curb	327	310	323	Ap.20, My. 10	Q 2.00
N. J. Zinc, new	N. Y. Curb	82¼	75¾	81		
New Quincy	Salt Lake	2.97½	2.72½	2.75		
Noble Five	Spokane	*77	*65	*65		
North Lily	Salt Lake	9.60	9.25	9.25	Jan. 20	Q 0.25
Park Bingham	Salt Lake	*12	*9¼	*11¼		
Park Utah	New York	11¾	10½	10½	Mr. 19, Ap. 10	Q 0.20
Pend Oreille	Spokane	14.00	8.50	8.50		
Rico Argentine	Salt Lake	*47½	*46½	*46½	No. 30, De. 15	Q 0.03
Ruth-Hope	Spokane	*45	*44	*44		
St. Joseph Lead	New York	73¾	68½	69¾	Ju. 8, Ju.20	QX 0.75
Sherman Lead	Spokane	*35¾	*33¼	*34		
Silver King Coa	Salt Lake	14.50	13.00	14.50	Mr. 20, Ap. 1	Q, 0.25
Silversmith	Spokane	*12	*9	*10½	Oct., 1926	Q 0.02
Sunshine Mining	Spokane	2.00	1.90	1.90	De. 20, BM	0.02
Tamarack-Custer	Spokane	*76	*68	*70	Sept., 1924	0.25
Tintic Standard	Salt Lake	15.12	14.75	14.75	De. 23, Ja. 23	X 0.20
Tonopah Belmont	N. Y. Curb			*2½	Oct., 1925	0.05
Treadwell-Yukon	Toronto	13	12	12¼		
United Zinc Smg	N. Y. Curb	1¼	1¼	1¼		
Utah Apex	Boston	5¾	5¼	5¼	Je. 14, Au. 1	K 0.25
Utah Met. & Tun	Boston	1¼	1¼	1¼	Dec., 1917	0.30
Whitewater	Spokane	1.10	1.00	1.00		
Yellow Pine	Los Angeles	*20	*15	*20	Dec., 1925	QX 0.04
GOLD						
Alaska Juneau	New York	7¼	6¾	6¾		
Barry-Hollinger	Toronto	*34	*28	*34		
Central Manitoba	Toronto	*51	*47	*50		
Coniaurum	Toronto	*45	*45	*45		
Cresson Consol	N. Y. Curb	*90	*85	*85	Mr.30, Ap.10	Q 0.02
Dome Mines	New York	9¼	8¾	9¼	Mr.30, Ap..20	Q 0.25
Golden Cycle	Col. Springs	†1.63	†1.61		Fe.15, Mr.1	0.04
Gold Hill	Toronto	*5¼	*4	*4		
Hollinger	Toronto	7.75	7.50	7.50	Ap.5, Ap.22	M 0.05
Homestake	New York	73¼	72¼	72¼	Mr.20, Mr.25	M 0.50
Kirland Lake	Toronto	1.25	1.08	1.15		
Lake Shore	Toronto	26.50	23.50	26.00	Mr.1, Mr.15	Q 0.20
McIntyre-Porc	New York			19¼	Fe.1, Mr.1	Q 0.25
Portland	Colo. Springs	†*12	†*9½		April, 1927	0.02
Rand Mines	New York	35	35	35	Fe. 21,'28	Am.Sh.1.52
Siscoe	Toronto	*85	*70	*70		
Sylvanite	Toronto	1.75	1.65	1.75		
Teck-Hughes	Toronto	9.00	8.00	8.95	Ap. 7,My 1, O	0.15
Tom Reed	Los Angeles	*31½	*25	*30	Dec., 1926	0.02
Unity Gold	N. Y. Curb	1¾	1¼	1¾		
Vipond Consol	Toronto	1.08	*96	1.06	April, 1927	0.03
Wright-Hargreaves	Toronto	1.95	1.75	1.90	Oc. 16, No. 1	0.02½
Yukon-Alaska	N. Y. Curb			35¼		
GOLD AND SILVER						
Carnegie Metals	N. Y. Curb	18	16½	18		
Castle-Trethewey	Toronto	*40	*34	*40		
Consol. Cortez	N. Y. Curb			*16		
Dolores Esperanza	N. Y. Curb	1¼	1	1¼	July, 1923	0.05
Keeley	Toronto	*40	*36	*36	Mr.15, 1928	0.04
Mining Corp	Toronto	4.90	4.60	4.65	De.14,De.31	SA 0.15
Montana-Idaho	Spokane	*15½	*11¾	*13		
N. Y. & Hond. Ros	N. Y. Curb	17¾	17¼	17¾	Ja.16, Ja.26	QX 0.50
Nipissing	N. Y. Curb	2¼	2¼	2¼	Mr.30,Ap.20	Q 0.07½
Premier Gold	N. Y. Curb	2	1¾	2	Mr.14, Ap.4	0.06
Tonopah Exten	N. Y. Curb			*10	April, 1925	0.05
Tonopah Mining	N. Y. Curb			3¾	Ap. 7, Ap. 20	0.07½
United Eastern	N. Y. Curb	*85	*85	*85		
Yukon Gold	N. Y. Curb			*76	June, 1918	0.02
IRON AND STEEL						
Bethlehem Steel	New York	113	98¾	110½	Fe. 15, R	1.00
Beth. Steel, pfd, 7%	New York	120¾	117¼	118	Mr.4, Ap.1	Q 1.75
Cleveland-Cliffs	Cleveland	230	195	210	Ap.15, Ap.25	Q 1.00
Colo. Fuel & Iron	New York	67¼	62	65¾		
Colorado F. & I., pfd	New York			133	Fe.11, Fe.25	Q 2.00
Great Northern Iron	New York	32½	30¾	30¾	Dec.15, K	2.00
Inland Steel	New York	93¾	89	91½	Fe. 15, Mr. 1, Q	0.87½
Republic I. & S.	New York	95	87¼	93	Fe. 13, Mr. 1, Q	1.00
Republic I. & S., pfd	New York			109	Mr.11, Ap. 1, Q	1.75
Sloss-Sheffield S. & I.	New York	115	112	115	Mr. 11, Mr.20, Q	1.50
Sloss-Sheff. S. & I., pfd.	New York			108	Mr.20, Ap.1, Q	1.75
U. S. Steel	New York	189	176¾	186¾	Fe. 28, Mr. 30, Q	1.75
U. S. Steel, pfd	New York	143¾	141¾	143	.Fe 2, Fe. 27, Q	1.75
Virginia I. C. & C.	New York			23	Jan., 1924	1.50
Virginia I.C.& C., pfd.	New York			45	Jl.16, 1928	SA2.50
MISCELLANEOUS						
Aluminum Co. of Am.	N. Y. Curb	169¾	165	169¾		
Alum.Co.of Amer., pf.	N. Y. Curb	106	105¾	105¾	Mr.15, Ap.1, Q	1.50
American Metal	New York	64¾	60¾	61¼	Fe.9, Mr.1 Q	0.75
Amer. Metal, pfd., 6%	New York	122	121½	122	Fe.9, Mr.1, Q	1.50
Amer. Sm. & Ref.	New York	110¾	104¾	105¾	Ap.12,My 1,Q	1.00
Amer. Sm. & Ref., pfd.	New York	136	135½	135¾	My. 3, Ju. 1 Q	1.75
Ang. Ch. Nitrate	N. Y. Curb	44¾	41	41		
Asbestos Corp.	Montreal	14½	13¾	14¾	Jan. 1926	1.50
Asbestos Corp., pfd	Montreal	45	42	43	De. 31, Ja. 15	Q 1.75
Consol. M. & S.	Montreal	450	437½	440	De.31,Ja.15,SA	X6.25
De Beers Consol	New York			22¾	Ja. 19, Ja.26,	0.48
Federated Metals	N. Y. Curb	35¾	34	35¾	Mr.27, Ap.5	Q 0.75
Freeport Texas	New York	47¼	44	46	Ap. 5, My. 1	Q 1.00
Int. Nickel Can	New York	50¾	46¾	48¼	Mr.16, Mr.30	Q 0.20
Int. Nickel, pfd	New York	121	121	121	Ap.2,My.1	No.1Q1.75
Newmont	N. Y. Curb	208¾	196	197	Mr.30, Ap.15	Q 1.00
Patiño M. & E.	New York	43¾	40¾	42	Aug. 1928	4s
So. America G. & P.	N. Y. Curb	2½	2¾	2¾		
Texas Gulf Sulphur	New York	81¼	77¼	78¾	Mr.4, Mr.15	Q 1.00
U. S. Sm. R. & M.	New York	66¾	63¼	63¾	Ap. 4, Ap. 15	Q 0.87½
U. S. Sm. R. & M., pfd.	New York	52¾	52¼	52¾	Ap. 4, Ap. 15	Q 0.87½
Vanadium Corp	New York	100¾	90	96	Fe.1, Fe. 15	Q 0.75

Toronto Standard Stock Exchange, Toronto, courtesy Arthur E. Moysey & Co.; Salt Lake Stock Exchange, courtesy J. A. Hogle & Co. and Logan & Bryan, New York; Spokane Stock Exchange, courtesy Pohlman Investment Company.

*Cents per share. †Bid or asked. Q, Quarterly. A. Annually. SA, Semi-annually. M, Monthly. BM, Bimonthly. FW, Four weeks. K, Irregular. I, Initial. R, Resumprion. X, Extra. The first data given is that of the closing of the books; the second that of the payment of the dividend.

LONDON QUOTATIONS—WEEK ENDED MARCH 26, 1929

	High	Low	Last	Date	Amount
Alaska Mexican ($5)	20/—	20/—	20/—		
Alaska Treadwell (25)	62/6	62/6	62/6	Nov., 1926	4 (d)
Armayo Mines (25 frs.)	68/9	66/3	68/9	Feb. 1929	5 (c)
Burma Corp (10 rupees)	19/1½	17/10½	18/1½	Feb., 1929	7 annas*
Bwana M'Kubwa (5s)	22/4½	19/—	19/3		
Camp Bird (2s)	2/10½	2/9	2/9	April, 1928	16¾
El Oro (£1)	5/—	4/7½	4/9	Nov., 1924	2½*
Frontino & Bolivia (£)	9/—	8/9	8/9	Jan., 1929	3¾
International Nickel of Canada (no par value)	$61¾	$48¾	$48¾	Mar., 1929	20(c)
Mexican Corpn. (£1)	11/6	10/10½	11/3		
Mexican Mines of El Oro (£1)	10/—	7/—	10/—	Dec., 1926	3¾*
Mount Isa (£)	47/6	44/3	46/3		
N'Changa Copper Mining. (£1)	90/—	73/9	80/—		
Oroville Dredging (4s)	2/9	2/7½	2/9	Nov., 1928	31½
Rhodesian Congo Border (£1)	168/1½	143/9	160/—		
St. John del Rey (£1)	16/3	14/9	16/—	Dec., 1928	2½
San Francisco Mines (10s)	39/—	37/1½	37/3	Jan., 1929	25
Santa Gertrudis (£1)	10/4½	10/—	10/—	Jan, 1929	7½
Selukwe (2s. 6d.)	7/3	6/9	7/—	April, 1917	6¼
S. Amer. Copper (2s.)	3/9	3/—	3/3	Nov. 1917	75
Tanganyika (£1)	72/9	69/—	70/9	July, 1928	5
Union Miniere de Haut-Katanga (Brussels)	12,985	12,600	12,600	July, 1928	182.60

*Free of British income tax. †Swiss francs and plus 15 p. c. bonus. ‡Belgian frs. and free of taxation.

(Price quoted in dollars with a fixed rate of $5 to the £1)